

FILED

AUG 31 1999

MEMORANDUM

Missouri Public  
Service Commission

TO: Missouri Public Service Commission Official Case File  
Case No. GO-99-155, Laclede Gas Company

FROM: Michael J. Loethen, Gas Department – Gas Safety *MLL*

*for wd*  
*for wd*  
*for wd*  
Utility Operations Division / Date 8/31/99

*for wd*  
Thomas R. Schwanz Jr. 8/31/99  
General Counsel's Office / Date

DATE: August 31, 1999

SUBJECT: Staff Report Pertaining To An Investigation Into Laclede's Leak Survey Procedures  
And Copper Service Line Replacement Program.

**BACKGROUND:**

Two Staff Gas Incident Reports (Report(s)) involving Laclede Gas Company (Laclede or Company), Case No. GS-98-422 (Pralle Lane) and Case No. GS-98-423 (Bergerac Drive) were filed on October 13, 1998. Staff's investigation into these cases initiated the creation of this case (Case No. GO-99-155). On October 30, 1998, the Missouri Public Service Commission (Commission) issued an Order Establishing Case, which created this case for the purpose of receiving information relevant to the adequacy of Laclede's copper service line replacement program, and the effectiveness of the Company's leak surveys and investigations. On April 30, 1999, the Commission's Gas Department – Gas Safety (Staff) filed an Official Case File Memorandum (Memorandum) updating the Staff's investigation into Case No. GO-99-155. Among other things, the Staff's April 1999 filing stated that a final report will be submitted to the Commission by August 31, 1999, detailing a long-term systematic copper service line replacement program.

**INTRODUCTION:**

Since November 1985 – February 1999, six natural gas incidents involving corrosion on direct-buried copper service lines have resulted in the death of one man, significant bodily burns suffered by a grandmother and her grandson, structural damage to at least six properties, and loss of personal belongings. The Staff has evaluated the circumstances of each of the six natural gas incidents and related Commission cases to support its proposal contained within.

This Staff report will address:

1. Previous commitments Laclede has made in prior filings or documents sent to the Commission and/or Staff pertaining to leak investigations and surveys, and replacements of direct-buried copper service lines.
2. Actions taken by Laclede to satisfy or modify previous commitments.

3. The Staff's proposal for a long-term systematic copper service line replacement program.

As a result of the complexity of Case No. GO-99-155, the Staff will address in this report the issues pertaining to the purposes of this case, Laclede's Leak Survey and Copper Service Line Replacement Program. Other related, but pending, cases such as the Pralle Lane, Bergerac Drive, and Valley Park (Case No. GS-99-371) Incident Reports as well as the complaint case (Case No. GC-99-151) will be addressed in separate filings.

## **STAFF INVESTIGATION / REPORT:**

For purposes of this report, **SECTION I** describes, in chronological order, the commitments, proposals, and modifications that Laclede has presented to the Staff. In **SECTION II**, the Staff will address these items identified by Laclede and submit a proposed course of action.

### **SECTION I      Actions Completed and Proposed by Laclede**

#### **A. Total Number of Direct-buried Copper Services**

As of April 1, 1999, Laclede verified to the Staff that there were 85,158 direct-buried copper service lines in their natural gas operating system.

This 85,158 number included any service line that was installed from main-to-meter as a direct-buried copper service line and has not been completely replaced from main-to-meter. Therefore, any partially replaced direct-buried copper service line is included in this number. As of July 16, 1999, Laclede had approximately 84,000 direct-buried copper services within its operating system, including partial replacements. Laclede also verified that approximately 5,900 direct-buried copper service lines would need to be replaced from July 16, 1999, to March 2001 in order to meet the Ringer Road Settlement.

#### **B. Laclede's Commitments in the Ringer Road Settlement**

On February 27, 1991, Laclede filed a STATEMENT OF SETTLEMENT AND SATISFACTION with the Commission. The Ringer Road Settlement was approved in March 1991. Contained within Laclede's STATEMENT OF SETTLEMENT AND SATISFACTION were the following statements, which reflect what they will do or have done pertaining to direct-buried copper service lines:

1. "proceed with additional studies recommended by Staff to evaluate copper service line incidents regarding factors such as septic tank involvement, water table, soil types, and other considerations;" page 5, (G).
2. "developed and began a program to identify separately all intermediate pressure and medium pressure copper services that were installed by direct burial, to help assure that all such copper services can be readily leak surveyed;" page 5, (H).

3. “established and expanded a copper service replacement program in areas susceptible to corrosion, to provide for the replacement of copper services on either side of a copper service that is being replaced due to corrosion.” page 5, (I).
4. “substitute an annual instrument leak survey over all direct buried intermediate pressure and medium pressure copper service lines, in lieu of the existing special mobile copper service survey, to assure that all direct buried copper services are leak surveyed annually over their entire length, where previously the survey was only over that portion of the service in the street right-of-way and only in areas of known active corrosion,” page 6, (C).
5. “expand the replacement program for copper services so as to replace over a period of ten years all remaining direct buried intermediate pressure and medium copper services within the right-of-way in known areas of active corrosion as presently defined by the criteria for the special copper mobile leak survey,” page 6, (D).
6. “compile a summary of copper service line replacements that were leaking due to corrosion denoting whether the leak location was in the right-of-way or in the yard. Compile a summary of the copper service line replacements where there was no leak detected. These summaries are to be compiled for each calendar year.” page 6, (E).

C. Laclede’s Actions and Proposals submitted April 16, 1999

On April 16, 1999, Laclede submitted a letter outlining in chronological order the actions they have taken or have planned since March of 1998. Much of this information was used by the Staff to compile its April 30, 1999, Memorandum. The Staff summarized Laclede’s efforts into improvements made in the following areas:

1. Training of personnel;
2. Modification of Company forms and procedures for better documentation and reporting of leaks;
3. Providing cellular phones to appropriate personnel thus minimizing the effect of losing leak tickets and increasing efficiency of Company personnel reporting detected natural gas leaks;
4. More accurately accounting for all direct-buried copper service lines;
5. Conducting additional surveys over direct-buried copper lines; and,
6. Increasing the annual number of direct-buried copper service line replacements in accordance with the requirements of the Ringer Road Settlement established in March 1991.

D. Laclede's Revised Direct Buried Copper Service Replacement and Maintenance Plan

On July 22, 1999, Laclede presented to the Staff a proposed revised Direct Buried Copper Service Replacement and Maintenance Plan. Much of the information provided by Laclede supported the Company's actions noted in its April 16, 1999, letter to the Staff. The Company also presented additional information pertaining to, but not limited to, the results of Laclede's bar-hole survey over all direct-buried copper service lines, replacement schedules, and evaluations of operating pressures on direct-buried copper service lines. Laclede's proposed schedule of actions as well as modifications to other currently established programs comprised the Company's presentation to the Staff.

To understand Laclede's revised proposal a certain level of background knowledge is required. As previously stated in this memorandum, as of July 16, 1999, Laclede had approximately 5,900 direct-buried copper service lines to replace by March 2001. The Company has stated in its April 16, 1999, letter that it was committed to replacing this number of direct-buried copper service lines, main-to-meter, which exceeds the partial replacement commitment stated in the 1991 Ringer Road Settlement. After completing a special bar-hole leak survey over all 85,000 plus direct-buried copper service lines (March – July 1999), a total of approximately 3,100 leaks were detected. All Class 1 and 2 leaks found during this survey have been repaired, either by main-to-meter or partial replacement. Approximately 2,800 Class 3 leaks were identified in the special bar-hole leak survey. These Class 3 leaks have been categorized by Laclede into two "Pressure Regions": Pressure Region 1 and Pressure Region 2. Pressure Region 1 contains approximately 25,500 direct-buried copper service lines and has an operating pressure that can be set above 35 psig, while Pressure Region 2, consisting of approximately 59,600 direct-buried copper service lines, operates below 35 psig. Out of the approximate 2,800 Class 3 leaks mentioned above, over 700 Class 3 leaks exist in Pressure Region 1. It should be noted that the operating systems within these pressure regions comprise service lines of various materials (copper, polyethylene, steel, etc.), other than just copper service line piping.

Below is the Staff's attempt to summarize Laclede's revised copper service line replacement and maintenance program as presented on July 22, 1999. Items 1. through 5. summarize the Company's proposed schedule of actions, while items 6. and 7. summarize the Company's proposed modification to other current programs.

1. Replace, main-to-meter, the 700 plus currently leaking copper service lines in Pressure Region 1 by January 1, 2000.
2. A Systematic Service Inspection bar-hole leak survey will be performed, incorporating a bar-hole over the service tee connection, over all direct-buried copper service lines in Pressure Region 1 during March, April, and May 2000 (Spring 2000). All Class 3 leaks found during this leak survey will be replaced prior to January 1, 2001.
3. All other direct-buried copper service lines will continue to be leak surveyed annually with incorporating a bar-hole over the service tee connection during the year 2000 leak survey.

4. Continue to develop a method for defining active corrosion on direct-buried copper service lines in order to eliminate unnecessary replacements.
5. Hire additional personnel dedicated to main-to-meter replacements of leaking direct-buried copper service lines.
6. Reduce the requirement of the bare steel service line replacement program (Laclede's Unprotected Steel Service Line and Yardline Replacement Program, Case No. GO-93-343) from 1,150 per year to 500 per year through December 31, 2001.
7. Request relief from completing the remaining approximate 5,900 direct-buried blanket copper service line replacements by March 15, 2001. By focusing on the replacement of leaking direct-buried copper service lines, the Revised Copper Service Replacement and Maintenance Program will replace at least 3,500 leaking direct-buried copper service lines, plus all additional leaking direct-buried copper service lines found in the future within the Pressure Regions on a prioritized basis. Replacements of non-leaking service lines will be suspended pending further data gathering and engineering analysis.

## **SECTION II                      Staff's Evaluation and Proposal**

### **A. Staff Corrections to April 1999 Memorandum**

Following the April 30, 1999, Memorandum filing with the Commission, Laclede reviewed and discussed the Memorandum with Staff and requested certain clarifications be made. Identified below are the statements where the Staff agrees clarifications are needed.

Page 3, First Paragraph

Statement:

A total of 9,709 direct-buried copper service lines were identified for replacement, which includes the previously mentioned adjacent service lines.

Clarification:

The stated total of 9,709 does not represent the initial total of direct-buried copper service lines identified in the Ringer Road Settlement. The 9,709 total represents the number of direct-buried copper service lines identified by Laclede for either main-to-meter or partial replacement, from February 1, 1998, to the Ringer Road Settlement completion date of March 2001.

Page 3, First Paragraph

Statement:

As of February 1, 1999, 2,665 direct-buried copper service lines have been replaced.

Clarification:

Since February 1, 1998, to April 1, 1999, 2,665 direct-buried copper service lines have been replaced.

Page 3, First Paragraph

Statement:

By March 15, 2001, Laclede is required to replace 7,044, or 3,522 per year, direct-buried copper service lines in known areas of active corrosion.

Clarification:

Starting April 1, 1999, to the Ringer Road Settlement completion date of March 2001, Laclede is required to replace 7,044, or approximately 3,500 per year, direct-buried copper service lines in known areas of active corrosion.

Page 4, c. First Paragraph

Statement:

Systematic Service Inspection forms (SSI also referenced as Form 712) were modified to include the location of the main and service tee locations of the service lines.

Clarification:

Systematic Service Inspection forms (SSI Form) were modified to include the location of the main and service tee locations of the service lines.

*All other places in SECTION I 1. of the April Memorandum where the Staff stated "Form 712" should be replaced with "SSI Form."*

**B. Staff's Evaluation of Laclede's Commitments and Proposals**

Since March 1991 to March 1998, the Staff believes Laclede should have exerted more effort to meet the requirements of the Ringer Road Settlement. The Staff believes Company efforts lacked in proceeding with additional studies to evaluate copper service line incidents regarding factors such as septic tank involvement, water table, soil types, and other considerations. The development of programs to identify separately all intermediate pressure and medium pressure copper service lines that were installed by direct burial, to help assure that all such copper service lines can be readily leak surveyed, were inadequate until after the Pralle Lane and Bergerac Drive incidents had occurred. For example, around the time of the Ringer Road Incident, Laclede had stated that there were approximately 78,652 direct-buried copper service lines throughout its system. Some replacements of direct-buried copper service lines had occurred between March 1991 and March 1998, thus reducing the total stated in the Ringer Road Report. However, not until March 1999 was the Company able to produce a more accurate count of 85,158 direct buried copper service lines within its system.

To identify leaking direct-buried copper service lines, the Staff believes leak surveys over the entire length of the copper service line is the best safety practice. Laclede made a commitment in the Ringer Road Settlement to conduct annual leak surveys in this manner, in lieu of, at that time, an existing special *mobile* copper service line survey over only the pipeline segments

located within the right-of-way. Following the Pralle Lane and Bergerac Drive incidents, a cooperative agreement between the Staff and Laclede resulted in provisions for additional personnel training, modification of Company leak survey and leak reporting policies and procedures, and incorporating service connection measurements on applicable Company forms. Prior to these implementations, the Staff believes that copper service lines were not always being leak surveyed over the entire length of the service line since its location was unknown to the leak surveyor. Laclede has cooperated by implementing these improvements, as well as initiating a bar-hole leak survey over all direct-buried copper service lines. Efforts such as these to improve the monitoring of copper service lines should continue to assure that all leaks are found.

In 1991, the Company instituted “a comprehensive replacement program.” The program was designed to establish a copper service line replacement program in areas susceptible to corrosion, and to provide for the replacement of copper service lines on either side of a copper service line that is being replaced due to corrosion. This program, which was to provide for the replacement of copper service lines on either side of a copper service line that is being replaced due to corrosion, did not provide a time period for replacement of the adjacent copper service lines. As a result of not having a specified time period, the Staff believes the Company has accumulated a backlog of direct-buried copper service line replacements. The Staff believes the Company has unintentionally allowed the number of required replacements to exceed the capacity of their pre-March 1998 operation’s replacement schedule.

In light of information gathered from investigation of the three recent incidents, Staff now believes that the Ringer Road Settlement was too narrowly focused to **known** areas of corrosion. Known areas of corrosion are not determined until a leak is confirmed to exist, while evidence supports the fact that corrosion exists on Laclede’s direct-buried copper service lines. At the time of detecting a corrosion leak on a copper service line, the extent of corrosion is not known, nor is it known whether surrounding copper service lines are also corroded. Known areas of corrosion were, in part, based upon repairs resulting from corrosion on a portion of a copper service line located within the right-of-way. This exempts any corrosion leak found on a short-sided copper service line (a service line serving a customer on the same side of the street as the main) or located at the riser of a copper service line. Also, under the Ringer Road Settlement, only after three corrosion leaks or leak repairs, meeting the qualification guidelines of the program, have occurred within a specified footage length, did the area become identified as a known area of active corrosion. In a January 16, 1991, correspondence to Laclede, Staff expressed its concern about the Company’s policy of partial replacements of only segments in the right-of-way. At that time, the Staff expressed concern that this policy left the customer premise segment in place when that segment may also be exposed to a corrosive environment in the future.

Three natural gas incidents occurred between March 1998 and February 1999 and, none of these areas were included in the replacement program. Interesting enough, as covered in the Bergerac Drive Report, the leaking copper service line contributing to the incident was not in the known areas of corrosion because it was a short-sided service line. However, most of the surrounding long-sided service lines in this area had been replaced because they fell into the definition of copper service lines located in known areas of corrosion. In conducting its

investigation, the Staff was not able to identify the rate of corrosion or determine which areas were more susceptible to corrosion. From incident reports, reviewing Company leak repairs, and customer complaint calls to the Commission, it is evident that corrosion is taking place on Laclede's direct-buried copper service lines.

Laclede's actions and proposals identified in SECTION I, C. of this memorandum are all efforts required to meet the Ringer Road Settlement and/or enhance the Company's previous policies and procedures for detecting and reporting leaks. In its April 16, 1999, correspondence to the Staff, the Company expressed a commitment to replace 7,044 direct buried copper service lines by March 15, 2001, satisfying the intent of the Ringer Road Settlement. The Company also stated this commitment has been modified to conduct replacements from main-to-meter, exceeding the partial service line replacement specified in the Ringer Road Settlement. These modifications progress towards conforming to the Staff's concerns expressed in 1991 regarding main-to-meter replacements as opposed to partial replacements.

As summarized in SECTION I, D., the Company's proposed Revised Direct Buried Copper Service Replacement and Maintenance Plan modifies the commitments stated in SECTION I, A., B., and C., in that it directs the focus of the copper service line replacements to those copper service lines currently determined to be leaking. The Company has also given higher priority to those leaking copper service lines in Pressure Region 1. The Company explained to the Staff on July 22, 1999, that each of the six previous incident locations, at a given time prior to their occurrence, operated at Pressure Region 1 pressures: only two incident locations were operating at Pressure Region 1 pressures at the time of the incident. The Staff agrees with the Company's emphasis on giving a higher priority to those copper service lines in elevated pressure regions. The Staff wants to emphasize also its concern with prioritizing replacements of the currently leaking copper service lines in Pressure Region 2. In four of the incidents relating to corrosion on Laclede's copper service lines, operating pressures at the time of the incidents were 21 psig or less. Higher operating pressures naturally increase the migration potential of leaking natural gas, but the migration potential of leaking natural gas at operating pressures found in Pressure Region 2 has unfortunately been demonstrated.

Staff believes Laclede's current efforts to hire additional personnel dedicated to main-to-meter replacements of direct-buried copper service lines could have been minimized had the Company better maintained their Ringer Road Settlement replacement schedule. Increasing replacement schedules and bar-hole leak surveys have now produced workloads in excess of the Company's normal operations. At this time, the Staff believes the Company's statement, "replacements of non-leaking services will be suspended pending further data gathering and engineering analysis," is less aggressive than contemplated by the Ringer Road Settlement, and does not establish an on-going, systematic program to replace copper service lines before leakage occurs. This does not take an aggressive approach in controlling the corrosive activity proven to exist on Laclede's direct-buried copper service lines. The Company proposes to replace the currently leaking copper service lines and any other leaks found during the Spring 2000 leak survey, which covers only those copper services in Pressure Region 1. The Company proposes it will eliminate approximately 3,500 leaking copper service lines, plus the leaks found in the Spring 2000 leak survey. The Staff is concerned that this number does not meet the 5,900 replacements by March 15, 2001, as required by the Ringer Road Settlement.



C. Staff's Proposal

Laclede has been cooperative throughout the Staff's investigation pertaining to this and other related cases. Staff agrees with and supports the Company's efforts in improving its leak survey and leak reporting policies and procedures. However, the number of copper service line replacements, even to meet the Ringer Road Settlement, appears to the Staff to be inadequate. Knowing that active corrosion exists, and reacting after a corrosion leak develops is not an appropriate long-term approach to removing corroded copper service lines before they become a potential disaster.

In a Staff correspondence to Laclede, dated January 16, 1991, the Staff suggested an annual replacement rate of 10% or more of those copper service lines in areas meeting the special copper survey procedure criteria. The Staff also stated in its April 30, 1999, Memorandum that it believed based upon the information gathered to date, a long-term systematic copper service line replacement program is warranted. After evaluating the evidence provided to date, Staff continues to believe that a long-term systematic copper service line replacement program is warranted.

The Staff believes the following items would be essential and should be included in a comprehensive Laclede copper service line replacement program.

1. Excluding emergency repairs, all underground leaks attributed to corrosion on direct-buried copper service lines should be replaced main-to-meter, regardless of the underground leak's location on the service line.
2. Replace, main-to-meter, the 700 plus currently leaking copper service lines in Pressure Region 1 by January 1, 2000.
3. Conduct a bar-hole leak survey, incorporating a bar-hole over the service tee connection, over all direct-buried copper service lines in Pressure Region 1 during Spring 2000. All Class 3 leaks found during this leak survey will be replaced prior to January 1, 2001.
4. All other currently leaking copper service lines in Pressure Region 2 must be replaced by January 1, 2001.
5. Continue to leak survey annually all direct-buried copper service lines, incorporating a bar-hole over the service tee connection. A bar-hole over the service tee connection should be implemented unless other leak survey practices are determined to better enhance the leak survey.
6. Implement a replacement rate of direct-buried copper service lines that replace approximately 5,900 total by March 15, 2001, as identified as satisfying the Ringer Road Settlement.

7. Implement a comprehensive replacement program, comprised of all direct-buried copper service lines, at a replacement rate of 10% annually. The 10% annual rate will be based upon the remaining direct-buried copper service lines in operation as of January 1, 2001.
8. Through data gathering and engineering analysis continue to develop a method for defining active corrosion on direct-buried copper service lines. Based upon this information, prioritize the replacements of direct-buried copper service lines.
9. Submit annual status reports to the Commission pertaining to the replacements of direct-buried copper service lines.
10. Reserve the right to submit a reevaluation of the 10% annual replacement program after five years of completing replacements at the initial 10% annual rate.

Therefore, Staff recommends that the Commission order Laclede to implement a comprehensive direct-buried copper service line replacement program that includes, at a minimum, the ten essential items listed above. The Staff understands that the commitments involved with this proposed 10% annual replacement rate proposal well exceed the Company's proposal. However, the Staff does not believe the replacement program that has been implemented since March 1991 is adequate, or effective since the type of incidents the agreement was designed to prevent continue to occur. The Company can not control the rate of corrosive activity taking place on its copper service lines, nor is it able to completely identify all copper service lines undergoing active corrosion prior to the copper service lines leaking. The most appropriate approach to take, which will yield an overall safer system and is within the Company's immediate control, is a systematic removal of direct-buried copper service lines.

MJL;RRL;RAF:mjl

Copies: Director – Utility Operations Division  
Director – Research and Public Affairs Division  
Director – Utility Services Division  
General Counsel  
Manager – Gas Department  
Manager - Accounting  
Manager - Depreciation  
Ralph Russell - Sr. VP of Operations & Marketing, Laclede Gas Company  
Paul Hunker – Asst. VP & Associate General Counsel, Laclede Gas Company  
Jim Smith – Vice President, Operations, Laclede Gas Company  
Craig Hoeflerlin – Chief Engineer, Laclede Gas Company  
Office of the Public Counsel