UNITED STATES SECURITIES AND EXCHANGE COMMISSION WASHINGTON, D.C. 20549

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CURRENT REPORT

Pursuant to Section 13 or 15(d) of The Securities Exchange Act of 1934

Date of Report (Date of earliest event reported): April 16, 2010

SPIRE CORPORATION

(Exact Name of Registrant as Specified in Charter)

Massachusetts 0-12742 04-2457335

(State or Other Jurisdiction of Incorporation) (Commission File Number) (IRS Employer Identification No.)

One Patriots Park, Bedford, Massachusetts 01730-2396 (Address of principal executive offices) (Zip Code)

(781) 275-6000

(Registrant's telephone number, including area code)

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

[] Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

| [|] | Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12) |
|----------|---|--|
| [(1' | | Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act 240.14d-2(b)) |
| [(1' | | Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act 240.13e-4(c)) |
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ITEM 5.02. DEPARTURE OF DIRECTORS OR CERTAIN OFFICERS; ELECTION OF DIRECTORS; APPOINTMENT OF CERTAIN OFFICERS; COMPENSATORY ARRANGEMENTS OF CERTAIN OFFICERS.

On April 16, 2010, the Board of Directors of Spire Corporation (the "Company") approved the appointment of Robert S. Lieberman as Chief Financial Officer (CFO) and Treasurer, effective immediately. The Company issued a press release on April 20, 2010 announcing Mr. Lieberman's appointment, a copy of which is attached hereto as Exhibit 99.1.

Mr. Lieberman, age 58, joined Spire Corporation in April 2009 as the Corporate Controller and has served as Chief Accounting Officer since December 2009. In his role as CFO and Treasurer, he will have the responsibility for accounting and financial oversight and strategic/governance participation. Mr. Lieberman is a graduate of Bernard M. Baruch College in New York and is a member of the American Institute of Certified Public Accountants, the New York State Society of Certified Public Accountants, as well as the Boston Chapter of the Financial Executives International. Before joining Spire Corporation, from May 2004 to January 2008, Mr. Lieberman served as Senior Vice President and CFO for Millbrook Distribution Services, Inc., a division of United Natural Foods, where he was responsible for the development and oversight of the finance area. Previously, from April 1999 to December 2003, he was CFO and Treasurer for Saleslink Corporation, a global supply chain management and eCommerce subsidiary of CMGI.

ITEM 9.01. FINANCIAL STATEMENTS AND EXHIBITS.

(d) Exhibits

Exhibit No. Description

Press Release of t

99.1 Press Release of the Company dated April 20,

2010.

SIGNATURE

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

SPIRE CORPORATION

Date: April 20, 2010 By: /s/ Roger G. Little

Roger G. Little Chairman and CEO

EXHIBIT INDEX

Exhibit No. Description

Press Release of the Company dated April 20,

99.1 Press 2010.