

SPIRE CORP
Form 424B3
May 15, 2006

Filed Pursuant to Rule 424(b)(3)

Registration No. 333-133776

PROSPECTUS

Spire Corporation

941,176 Shares of Common Stock

This prospectus relates to the offer and sale by the selling stockholders identified in this prospectus, and any of their pledgees, donees, transferees or other successors in interest, of up to an aggregate of 941,176 shares of the common stock of Spire Corporation. We are filing the registration statement of which this prospectus is a part at this time to fulfill contractual obligations to do so, which we undertook at the time of the original issuance of common stock in our April 2006 financing transaction. We will not receive any of the proceeds from the sale of the common stock by the selling stockholders.

We have agreed to pay certain expenses in connection with the registration of the shares and to indemnify the selling stockholders against certain liabilities. The selling stockholders will pay all underwriting discounts and selling commissions, if any, in connection with the sale of the shares.

The selling stockholders identified in this prospectus, or their pledgees, donees, transferees or other successors-in-interest, may offer the shares from time to time through public or private transactions at prevailing market prices, at prices related to prevailing market prices or at privately negotiated prices.

Our common stock is traded on the Nasdaq National Market under the symbol SPIR. On May 1, 2006, the closing sale price of the common stock on Nasdaq was \$9.49 per share. We urge you to obtain current market quotations for our common stock.

Investing in our common stock involves a high degree of risk. See Risk Factors beginning on page 2.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus is May 12, 2006

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Our executive offices are located at One Patriots Park, Bedford, Massachusetts 01730, our telephone number is (781) 275-6000 and our Internet address is www.spirecorp.com. The information on our Internet website is not incorporated by reference in this prospectus.

We have not authorized anyone to provide you with information different from that contained or incorporated by reference in this prospectus. The selling stockholders are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where offers and sales are permitted. The information contained in this prospectus is accurate only as of the date of this prospectus, regardless of the time of delivery of this prospectus or of any sale of common stock.

PROSPECTUS SUMMARY

This summary highlights important features of this offering and the information included or incorporated by reference in this prospectus. This summary does not contain all of the information that you should consider before investing in our common stock. You should read the entire prospectus carefully, especially the risks of investing in our common stock discussed under Risk Factors.

Unless the context otherwise requires, all references in this prospectus to Spire, we, us, and our refer to Spire Corporation and its subsidiaries.

Spire Corporation

We develop, manufacture and market highly-engineered products and services in four principal business areas: solar equipment, solar systems, biomedical and optoelectronics, generally bringing to bear expertise in materials technologies, surface science and thin films across all four business areas. In some cases, such as IonGuard® processing of orthopedic devices, commercial services are well established, while in other cases, commercialization is just beginning.

In the solar equipment area, we develop, manufacture and market specialized equipment for the production of terrestrial photovoltaic modules from solar cells. Our equipment has been installed in approximately 170 factories in 43 countries.

In the solar systems area, we provide custom and building integrated photovoltaic modules, stand-alone emergency power back up and electric power grid-connected distributed power generation systems employing photovoltaic technology developed by us.

In the biomedical area, we provide value-added surface treatments to manufacturers of orthopedic and other medical devices that enhance the durability, antimicrobial characteristics or other material characteristics of their products; develop and market hemodialysis catheters and related devices for the treatment of chronic kidney disease and perform sponsored research programs into practical applications of advanced biomedical and biophotonic technologies.

In the optoelectronics area, we provide custom compound semiconductor foundry and fabrication services on a merchant basis to customers involved in biomedical/biophotonics instruments, telecommunications and defense applications. Services include compound semiconductor wafer growth, other thin film processes and related device processing and fabrication services. We also provide materials testing services and perform services in support of sponsored research into practical applications of optoelectronic technologies.

The Offering

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Common stock offered by selling
stockholders

941,176 shares

Use of proceeds

We will not receive any proceeds from the sale of shares in this offering.

Nasdaq National Market symbol

SPIR

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should carefully consider the risks and uncertainties described below before purchasing our common stock. If any of the following risks actually occur, our business, financial condition or results of operations would likely suffer. In that case, the trading price of our common stock could fall, and you may lose all or part of the money you paid to buy our common stock.

Risks Relating to our Business

Our success will depend upon our ability to effectively implement our business model of creating or acquiring scientifically advanced technology, developing and manufacturing commercially viable products from such technology and successfully marketing and distributing such products. The failure to successfully execute any stage of this process could have a materially negative impact on our business and results of operations.

We believe that our success will depend upon our ability to create or acquire scientifically advanced technology, apply our technology cost-effectively across product lines and markets, develop or acquire proprietary products, attract and retain skilled development personnel, obtain patent or other protection for our products, obtain required regulatory approvals, manufacture and successfully market our products either directly or through outside distributors and sales representatives and supply sufficient inventory to meet customer demand. There can be no assurance that we will realize financial benefit from our technology development and application efforts, that we will be successful in identifying, developing and marketing new products or enhancing our existing products, or that products or technologies developed by others will not render our products or technologies non-competitive or obsolete.

We have experienced losses from operations, before the sale of certain technology licenses, for several quarters, and we expect that our operating results will fluctuate in the future.

We have experienced losses from operations, before the sale of certain technology licenses, in each of the past two full years. These losses have resulted in an accumulated deficit of approximately \$1.6 million as of December 31, 2005. While our revenues have steadily increased since fiscal 2000, they are still not sufficient to cover our operating expenses, and we anticipate that we may sustain future losses from operations as a result. Future fluctuations in operating results may also be caused by a number of factors, many of which are outside our control. Additional factors that could affect our future operating results include the following:

Availability of raw materials required to perform the manufacturing or services we provide, particularly in the silicon wafer and solar cell markets;

Availability of raw materials processed by the capital equipment we provide to our buyers, particularly the polysilicon used in the manufacture of the silicon wafers and solar cells;

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Delays, postponements or cancellations of orders and shipments of our products, particularly in our solar equipment and solar systems businesses where individual order sizes may be large and thus may represent a significant portion of annual revenue;

Changes in our receipt of license fees, milestone payments, and royalty payments relating to our intellectual property, some receipts of which are based on the attainment of milestones and licensee sales that are beyond our control;

Loss of major customers, particularly as a result of customers changing their own product designs in such ways as reduce or eliminate the need for the manufacturing services we provide;

Reductions in the selling prices of our products and services as a result of competitive pressures;

Delays in introducing and gaining physician acceptance for new products and product improvements, particularly in our biomedical products business;

Disruption in the distributor sales channels by which we bring our biomedical products to market;

Variation in capacity, capacity utilization and manufacturing yields within the third party medical contract manufacturing service providers that constitute the supply chain for our biomedical products that, in turn, cause variation in our ability to timely ship our products;

Increased competition from current and future competitors, including competition resulting from services and products utilizing competing technologies;

Variation in the timing of customer orders and inventory levels at our customers, particularly within our biomedical manufacturing services business; and

Termination of existing grants with government agencies or delays in funding of grants awarded.

If we are unable to reach and sustain profitability from our operations, we risk depleting our working capital balances and our business may not continue as a going concern. In addition, we may need to raise additional capital in order to sustain our operations. There can be no assurance that we will be able to raise such funds if they are required.

Our ability to expand revenue and sustain profitability depends substantially on the stability and growth of the various markets for our products and services. Should we be unable to expand our revenue, our ability to reach and sustain profitability would be impaired.

The world demand for photovoltaic manufacturing equipment depends on sustained expansion in the demand for decentralized power sources, especially in developing countries, and on domestic and foreign government funding of initiatives to invest in solar energy as an alternative to the burning of fossil fuels and other energy production methods. There can be no assurance that government funding for such initiatives will be available, or that solar energy will prove to be a cost-effective alternative to other energy sources and thus gain acceptance where traditional energy sources continue to be available. Should demand for solar photovoltaic power sources not increase, demand for new photovoltaic manufacturing equipment would not materialize and our business would be adversely affected.

Most of our research and development revenues are generated by contracts with the United States government. There can be no assurance that the United States government will fund our research and development projects at the same level as it has in the past. Should federal research funding priorities change, and should we be unable to adjust our research focus to reflect the shift, our business could be adversely affected.

Our solar systems business unit is dependent on continued and increased order activity from the development of other industrial and residential sales opportunities. Should we be unable to capture a significant stream of new solar system installation projects from a more diverse group of project sponsors, our solar systems business could be adversely affected.

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The growth of our biomedical products business depends on increased physician acceptance of our hemodialysis catheter products, our ability to manage the production of higher unit volumes of catheter products and our ability to effectively distribute those products. Should our hemodialysis catheters not gain market acceptance or should we not be able to meet demand for our products, our biomedical products business could be adversely affected.

The growth of our biomedical services business depends upon our customers' ability to serve demand for the end-use items, such as orthopedic prostheses, on which our services are performed and thus is substantially beyond our control.

Our ability to expand our biomedical business depends upon our ability to introduce new products and services. The marketing of new biomedical products requires pre-approval of government regulatory authorities, the completion of which can be lengthy and more costly than originally planned.

The growth of our optoelectronics business depends upon growth in demand for compound semiconductor wafers

from manufacturers of microwave and optoelectronic circuits and sensors that, in turn, are used in diverse biomedical, telecommunications and aerospace products. Should these end-use markets not experience anticipated levels of growth and, in the case of telecommunications uses, experience a recovery from currently depressed business levels, our optoelectronics business could be adversely affected.

We have not consistently complied with Nasdaq's Marketplace Rules for Continued Listing, which exposes us to the risk of delisting from the Nasdaq National Market.

Our stock is currently listed on the Nasdaq National Market. In August 2003, we received notice from Nasdaq that we were not in compliance with Nasdaq's Marketplace Rules as a result of filing our second quarter Form 10-QSB prior to the completion of the review by our independent auditors and, accordingly, were subject to possible delisting. We subsequently filed all reports and were able to maintain our continued listing on the Nasdaq National Market.

In April 2005, we received notice from Nasdaq that we were not in compliance with the minimum stockholders' equity level of \$10,000,000 required for continued listing on the Nasdaq National Market. Following the submission of a plan of compliance and making later filings showing this deficiency no longer existed, Nasdaq subsequently notified us that we had achieved compliance with the \$10,000,000 stockholders' equity threshold during 2005 and the matter was closed. However, as of December 31, 2005, we were not in compliance with the minimum stockholders' equity threshold. As a result, we did not meet Standard No. 1 for continued listing on the Nasdaq National Market. However, we did meet Standard No. 2 for continued listing on the Nasdaq National Market as the market value of our listed securities exceeded \$50,000,000 and we met all of the other requirements of Standard No. 2. In order to remain in compliance with Standard No. 2, the market value of our listed securities cannot fall below \$50,000,000 for ten consecutive trading days at any point. If we fail to maintain compliance with these rules and our common stock is delisted from the Nasdaq National Market, there could be a number of negative implications, including reduced liquidity in the common stock as a result of the loss of market efficiencies associated with the Nasdaq National Market, the loss of federal preemption of state securities laws, the potential loss of confidence by suppliers, customers and employees, as well as the loss of analyst coverage and institutional investor interest, fewer business development opportunities and greater difficulty in obtaining financing.

Our business relies in part on a limited number of customers, and unfavorable developments in relation to a major customer may adversely affect our revenues, operating results and cash flows.

While no customer accounted for more than 10% of consolidated net sales and revenues in fiscal 2005, in the past we have had such customers and may have them again in the future. If an unfavorable development were to occur with respect to any significant customer it would likely have a material adverse affect on our business, financial condition, operating results, cash flows and future prospects.

We sell our products and services against established competitors, and entities now operating in related markets may enter our markets. Some of our current and potential competitors have greater financial and technical resources than we do. Should we be unable to offer our customers products and services that represent attractive price versus value, our business would suffer.

Although we believe that there are considerable barriers to entry into the markets we serve, including a significant investment in specialized capital equipment, product design and development, and the need for a staff with sophisticated scientific and technological knowledge, there can be no assurance that new or existing entities would not seek to enter our markets or that we would be able to compete effectively against such entities.

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In our biomedical products business, our hemodialysis catheter products directly compete against the already established product offerings of larger competitors. Although we believe that our catheter products offer significant advantages, widespread physician acceptance of these products in preference to the more established products of competitors cannot be assured.

In our optoelectronics business, our manufacturing services may compete against the internal manufacturing capabilities of our customers. Although we believe that we offer significant advantages in terms of timely response, reduced total cost and reduced capital investment over the captive fabrication facilities of our

customers, customers may elect to maintain their internal capabilities despite economic incentives to outsource these services from us.

If we are unable to develop and introduce new products successfully or to achieve market acceptance of our new products, our operating results would be adversely affected.

We compete in markets characterized by technological advances and improvements in manufacturing efficiencies. Our ability to operate profitably depends in large part on our timely access to, or development of, technological advances, and on our ability to use those advances to improve existing products, develop new products and manufacture those products efficiently. There can be no assurance that we will realize financial benefit from our development programs, will continue to be successful in identifying, developing and marketing new products or enhancing our existing products, or that products or technologies developed by others will not render our products or technologies non-competitive or obsolete. The failure to introduce new or enhanced products on a timely and cost competitive basis, or to attain market acceptance for commercial products, could have a material adverse effect on our business, results of operations or financial condition.

If we are not successful in protecting our intellectual property rights, our ability to compete may be harmed.

We rely on a combination of patent, copyright, trademark and trade secret protections as well as confidentiality agreements and other methods, to protect our proprietary technologies and processes. For example, we enter into confidentiality agreements with our employees, consultants and business partners, and control access to and distribution of our proprietary information. We have been issued 34 United States patents, one of which is jointly owned, and have a number of pending patent applications. However, despite our efforts to protect our intellectual property, we cannot assure that:

The steps we take to prevent misappropriation or infringement of our intellectual property will be successful;

Any existing or future patents will not be challenged, invalidated or circumvented;

Any pending patent applications or future applications will be approved;

Others will not independently develop similar products or processes to ours or design around our patents; or

Any of the measures described above would provide meaningful protection.

A failure by us to meaningfully protect our intellectual property could have a material adverse effect on our business, financial condition, operating results and ability to compete. In addition, effective patent, copyright, trademark and trade secret protection may be unavailable or

limited in certain countries.

We depend on others, particularly on agencies of the United States government, for funding our research and development effort.

Substantially all of our research and development work is funded by agencies of the United States government either directly or via their contractors. Loss of outside funding may materially adversely affect our ability to further develop our proprietary technologies and to apply these technologies to our current products and products under development. If we are unable to maintain our current level of such funding for any reason, we would need to generate funds for such research from other sources, reduce our research and development effort or increase our internal funding for research and development. An increase in internally funded research and development would have a negative impact on our profitability.

Additionally, the process of bidding for, obtaining, retaining and performing United States government contracts is subject to a large number of United States government regulations and oversight requirements. Compliance with these government regulations requires extensive record keeping and the maintenance of complex policies and procedures relating to all aspects of our business, as well as to work performed for us by any subcontractors. Any failure to comply with applicable regulations, or to require our subcontractors so to comply, could result in a variety of adverse

consequences, ranging from remedial requirements to termination of contracts, reimbursement of fees, reduction of fees on a going forward basis and prohibition from obtaining future United States government contracts. While we believe that we have in place systems and personnel to ensure compliance with all United States government regulations relating to contracting, we cannot assure that we will at all times be in compliance or that any failure to comply will not have a material adverse effect on our business, results of operations or financial condition.

The U.S. government has certain rights relating to our intellectual property.

The United States government retains the right to obtain a patent on any invention developed under government contracts as to which we do not seek and obtain a patent, and may require us to grant a third party license of such invention if steps to achieving practical application of the invention have not been taken. The United States government also retains a non-exclusive, royalty-free, non-transferable license to all technology developed under government contracts, whether or not patented, for government use, including use by other parties to United States government contracts. Furthermore, our United States government contracts prohibit us from granting exclusive rights to use or sell any inventions unless the grantee agrees that any product using the invention will be manufactured substantially in the United States.

We depend on third-party contractors to manufacture substantially all of our current biomedical products.

We depend on third-party subcontractors in the U.S. and abroad for the manufacturing, assembly and packaging of our biomedical products. Any difficulty in obtaining parts or services from these subcontractors could affect our ability to meet scheduled product deliveries to customers, which could in turn have a material adverse effect on our customer relationships, business and financial results. Several significant risks are associated with reliance on third-party subcontractors, including:

The lack of assured product supply and the potential for product shortages;

Reduced control over inventory located at contractors' premises;

Limited control over delivery schedules, manufacturing yields and production costs;

Direct control over product quality; and

The temporary or permanent unavailability of, or delays in obtaining, access to key process technologies.

Our success depends on our ability to hire and retain qualified technical personnel, and if we are unable to do so, our product development efforts and customer relations will suffer.

Our products require sophisticated manufacturing, research and development, marketing and sales, and technical support. Our success depends on our ability to attract, train and retain qualified technical personnel in each of these areas. Competition for personnel in all of these areas is intense and we may not be able to hire or retain sufficient personnel to achieve our goals or support the anticipated growth in our business. The market for the highly trained personnel we require is very competitive, due to the limited number of people available with the necessary technical skills and understanding of our products and technology. If we fail to hire and retain qualified personnel, our product development efforts and customer relations will suffer.

We are subject to environmental laws and other legal requirements that have the potential to subject us to substantial liability and increase our costs of doing business.

Our properties and business operations are subject to a wide variety of federal, state, and local environmental, health and safety laws and other legal requirements, including those relating to the storage, use, discharge and disposal of toxic, volatile or otherwise hazardous substances used in our manufacturing processes. We cannot assure you that these legal requirements will not impose on us the need for additional capital expenditures or other requirements. If we fail to obtain required permits or otherwise fail to operate within these or future legal requirements, we may be required to pay substantial penalties, suspend our operations or make costly changes to our manufacturing processes or facilities.

Although we believe that we are in compliance and have complied with all applicable legal requirements, we may also be required to incur additional costs to comply with current or future legal requirements.

Our international sales subject us to risks that could adversely affect our revenue and operating results.

Sales to customers located outside the U.S. have historically accounted for a significant percentage of our revenue (approximately 33% in 2005) and we anticipate that such sales will continue to be a significant percentage of our revenue. International sales involve a variety of risks and uncertainties, including risks related to:

Reliance on strategic alliance partners such as representatives and licensees;

Compliance with changing foreign regulatory requirements and tax laws;

Reduced protection for intellectual property rights in some countries;

Longer payment cycles to collect accounts receivable in some countries;

Political instability;

Economic downturns in international markets; and

Changing restrictions imposed by United States export laws.

Failure to successfully address these risks and uncertainties could adversely affect our international sales, which could in turn have a material and adverse effect on our results of operations and financial condition.

The use of our catheter and other medical related products entails a risk of physical injury; the defense of claims arising from such risk may exceed our insurance coverage and distract our management.

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The use of orthopedic and other medical devices may entail a risk of physical injury to patients. To the extent we have been involved in the design and manufacturing of these products, we may be exposed to potential product liability and other damage claims. Furthermore, the use of our photovoltaic module manufacturing equipment could result in operator injury. Except for those cases brought against us in which it is alleged that we engaged in the manufacture and sale of defective heart valves with other defendants, no other claims of product liability or other damages have been initiated against us. We maintain product liability and umbrella insurance coverage; however, there can be no assurance that any product liability claim assessed against us would not exceed our insurance coverage, or that insurance coverage would continue to be available. While we typically obtain agreements of indemnity from manufacturers of biomedical products for which we provide manufacturing services, there can be no assurance that any such indemnity agreements will be enforceable or that such manufacturers will have adequate funds to meet their obligations under such agreements. The cost of defending a product liability, negligence or other action, and/or assessment of damages in excess of insurance coverage, could have a material adverse effect on our business, results of operations, or financial condition.

Risks Related to Our Company

Our Company is subject to control by a principal stockholder.

Roger G. Little, our founder, Chairman of the Board, President and Chief Executive Officer, controls approximately 27% of our outstanding common stock. As a result, Mr. Little is in a position to exert significant influence over actions which require stockholder approval and generally to direct our affairs, including the election of directors, potential acquisitions and sales or otherwise preventing or delaying changes in control of us that may be otherwise viewed as beneficial by shareholders other than Mr. Little.

As of the first fiscal quarter of 2006, we are now required to account for equity incentive grants under our stock plans as a compensation expense which will negatively impact our results of operations.

As of the first fiscal quarter of 2006, we are required to comply with the Financial Accounting Standard Board's Statement 123R, Share-Based Payment. Accordingly, we are now required to expense all employee stock options and similar awards granted, modified, cancelled or repurchased as well as the portion of prior awards for which the requisite service has not been rendered, based on the grant-date fair value of those awards. SFAS No. 123R also requires the benefits of tax deductions in excess of recognized compensation cost to be reported as a financing cash flow, rather than as an operating cash flow as previously required. This requirement will reduce net operating cash flows and increase net financing cash flows in fiscal periods following December 31, 2005. As a result of being required to record compensation expense for equity incentives under SFAS No.123R, our operating margins may decrease, we are likely to experience increased expenses and our tax rates may be affected.

We do not pay dividends and may not pay dividends in the future.

We have paid no cash dividends since the Company's inception. We anticipate retaining any future earnings for reinvestment in operations and do not anticipate that dividends will be paid in the foreseeable future. Thus, the return on investment should be expected to depend on changes in the market price of our common stock.

The market price for our common stock has been volatile and future volatility could cause the value of investments in us to fluctuate.

Our stock price has experienced significant volatility. While our revenues have increased since 2000, we expect that uncertainty regarding demand for our products will cause our stock price to continue to be volatile. In addition, the value of your investment could decline due to the impact of any of the following factors, among others, upon the market price of our common stock:

Additional changes in investment analysts' estimates of our revenues and operating results;

Our failure to meet investment analysts' performance expectations; and

Changes in market valuations of other companies in the biomedical, alternative energy or semiconductor industries.

In addition, many of the risks described elsewhere in this section could materially and adversely affect our stock price, as discussed in those risk factors. U.S. financial markets have recently experienced substantial price and volume volatility. Fluctuations such as these have affected and are likely to continue to affect the market price of our common stock.

SPECIAL NOTE REGARDING FORWARD-LOOKING INFORMATION

This prospectus includes and incorporates forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements, other than statements of historical facts, included or incorporated in this prospectus regarding our strategy, future operations, financial position, future revenues, projected costs, prospects, plans and objectives of management are forward-looking statements. The words anticipates, believes, estimates, expects, intends, may, plans, projects, will, would and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. We cannot guarantee that we actually will achieve the plans, intentions or expectations disclosed in our forward-looking statements and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included or incorporated in this prospectus, particularly under the heading Risk Factors, that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking

statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make. We do not assume any obligation to update any forward-looking statements.

USE OF PROCEEDS

We will not receive any proceeds from the sale of shares by the selling stockholders. The selling stockholders will pay any underwriting discounts and commissions and expenses incurred by the selling stockholders for brokerage, accounting, tax or legal services or any other expenses incurred by the selling stockholders in disposing of the shares. We will bear all other costs, fees and expenses incurred in effecting the registration of the shares covered by this prospectus, including, without limitation, all registration and filing fees, Nasdaq listing fees and fees and expenses of our counsel and our accountants.

SELLING STOCKHOLDERS

We are filing this registration statement pursuant to stock purchase agreements dated April 26, 2006 with two accredited institutional investors to sell 941,176 shares of common stock in a private placement at a price of \$8.50 per share. The transaction closed on April 28, 2006. We are registering the shares of common stock in order to permit the selling stockholders to offer the shares for resale from time to time. None of the selling stockholders has, or within the past three years has had, any position, office or other material relationship with us or any of our predecessors or affiliates.

Under the terms of our agreements with the selling stockholders, we agreed to file the registration statement of which this prospectus is a part to register the sale by the selling stockholders of the shares of common stock issued to them. We also agreed to keep the registration statement effective until the earlier of (i) the second anniversary of the closing date, (ii) the date on which each investor may sell all shares then held by such investor without restriction by the volume limitations of Rule 144(e) of the Securities Act of 1933, or (iii) such time as all shares purchased by the investors pursuant to the agreements have been sold pursuant to a registration statement.

The following table sets forth the number of shares of common stock beneficially owned by the selling stockholders as of April 28, 2006, the number of shares of common stock covered by this prospectus and the total number of shares of common stock that the selling stockholders will beneficially own upon completion of this offering. This table assumes that the selling stockholders will offer for sale all of the shares of common stock covered by this prospectus.

The common stock offered by this prospectus may be offered from time to time by the selling stockholders named below, or by any of its pledgees, donees, transferees or other successors in interest, provided that any pledgees, donees, transferees or other successors in interest offering common stock using this prospectus is named as a selling stockholder in a prospectus supplement unless sales by that person or entity under this prospectus could not exceed 500 shares, in which case that person or entity need not be named in a prospectus supplement. The amounts set forth below are based upon information provided to us by representatives of the selling stockholders, or on our records, as of April 28, 2006, and are accurate to the best of our knowledge. It is possible, however, that a selling stockholder may acquire or dispose of additional shares of common stock from time to time after the date of this prospectus.

| Name of Selling Stockholder | Common Stock Beneficially Owned as of 4/28/06 | Common Stock Offered Hereby(1) | Common Stock to be Beneficially Owned After Offering (2) | |
|--|---|--------------------------------|--|------------|
| | | | Number | Percentage |
| Federated Kaufmann Small Cap Fund, a portfolio of Federated Equity Funds (3) | 571,420 | 571,420 | 0 | 0 |
| Hare & Co., as nominee for American Skandia Trust, Federated Aggressive Growth Portfolio (4) | 369,756 | 369,756 | 0 | 0 |
| Total | 941,176 | 941,176 | 0 | 0 |

(1) Represents shares of common stock issued in our private placement in April 2006.

(2) We do not know when or in what amounts a selling stockholder may offer shares for sale. The selling stockholders may not sell any or all of the shares offered by this prospectus. Because the selling stockholders may offer all or some of the shares pursuant to this offering, and because there are currently no agreements, arrangements or understandings with respect to the sale of any of the shares, we cannot estimate the number of the shares that will be held by the selling stockholders after completion of the offering. However, for purposes of this table, we have assumed that, after completion of the offering, none of the shares covered by this prospectus will be held by the selling stockholders.

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(3) Federated Kaufmann Small Cap Fund (FKSCF) is a portfolio of Federated Equity Funds, a registered investment company. The parent holding company of FKSCF s advisors is Federated Investors Inc. FKSCF s advisor is Federated Equity Management Company of Pennsylvania (FEMCPA) which has

delegated daily management of the fund's assets to Federated Global Investment Management Corp. (FGIMC), as subadvisor. While the officers and directors of FEMCPA have dispositive power over FKSCF's portfolio securities, they customarily delegate this dispositive power, and therefore the day to day dispositive decisions are made by the portfolio managers of FKSCF, currently, Lawrence Auriana, Hans P. Utsch, Aash Shah and John Ettinger. Messrs. Auriana, Utsch, Shah and Ettinger disclaim any beneficial ownership of the shares. With respect to voting power, FKSCF has delegated the authority to vote proxies to FEMCPA. FEMCPA has established a Proxy Voting Committee to cast proxy votes on behalf of FKSCF in accordance with proxy voting policies and procedures approved by FKSCF.

(4) AST Federated Aggressive Growth Portfolio (AGP) is a portfolio of American Skandia Trust, a registered investment company. The parent holding company of AGP's subadvisors is Federated Investors Inc. AGP's advisor is Prudential Investments, LLC which has delegated daily management of the fund's assets to Federated Equity Management Company of Pennsylvania (FEMCPA), as subadvisor, which has in turn delegated daily management of the fund's assets to Federated Global Investment Management Corp. (FGIMC), as sub-sub-advisor. While the officers and directors of Prudential Investments, LLC have dispositive power over AGP's portfolio securities, they customarily delegate this dispositive power, and therefore the day to day dispositive decisions are made by the portfolio managers of AGP, currently, Lawrence Auriana, Hans Utsch, Aash Shah and John Ettinger. Messrs. Auriana, Utsch, Shah and Ettinger disclaim any beneficial ownership of the shares. With respect to voting power, AGP has delegated the authority to vote proxies to FEMCPA. FEMCPA has established a Proxy Voting Committee to cast proxy votes on behalf of AGP in accordance with proxy voting policies and procedures approved by AGP.

PLAN OF DISTRIBUTION

The shares of our common stock covered by the registration statement, of which this prospectus is a part, are being offered on behalf of the selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest disposing of shares of our common stock or interests therein received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer. We will not receive any proceeds from the sale of shares of our common stock covered by the registration statement, of which this prospectus is a part, or interests therein. The shares of our common stock or interests therein may be sold from time to time by the selling stockholders directly to one or more purchasers (including pledgees) or through brokers, dealers or underwriters who may act solely as agents or who may acquire shares as principals, at market prices prevailing at the time of sale, at prices related to such prevailing market prices, at negotiated prices, or at fixed prices, which may be changed. The shares of our common stock may be sold by one or more of, or a combination of, the following methods, to the extent permitted by applicable law:

a block trade in which the selling stockholder's broker or dealer will attempt to sell the shares as agent, but may position and resell all or a portion of the block as a principal to facilitate the transaction;

a broker or dealer may purchase the common stock as a principal and then resell the common stock for its own account pursuant to this prospectus;

an exchange distribution in accordance with the rules of the applicable exchange;

ordinary brokerage transactions and transactions in which the broker solicits purchasers;

privately negotiated transactions;

by pledge to secure debts or other obligations;

put or call transactions;

to cover hedging transactions;

underwritten offerings; or

any other legally available means.

To the extent required, this prospectus may be amended or supplemented from time to time to describe a specific plan of distribution. If the plan of distribution involves an arrangement with a broker-dealer for the sale of shares through a block trade, special offering, exchange distribution or secondary distribution or a purchase by a broker or dealer, the supplement will disclose:

the name of the selling stockholder and of the participating broker-dealer(s);

the number of shares involved;

the price at which the shares were sold;

the commissions paid or discounts or concessions allowed to such broker-dealer(s), where applicable;

that such broker-dealer(s) did not conduct any investigation to verify the information set out or incorporated by reference in this prospectus; and

other facts material to the transaction.

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In effecting sales, broker-dealers engaged by the selling stockholders may arrange for other broker-dealers to participate in the resales.

The selling stockholders may enter into hedging transactions with broker-dealers in connection with distributions of the shares or otherwise. In these transactions, broker-dealers may engage in short sales of the shares in the course of hedging the positions they assume with the selling stockholders. The selling stockholders may also sell shares short and redeliver the shares to close out such short positions. The selling stockholders may enter into options or other transactions with broker-dealers that require the delivery to the broker-dealer of the shares. The broker-dealer may then resell or otherwise transfer such shares pursuant to this prospectus. The selling stockholders also may loan or pledge the shares to a broker-dealer. The broker-dealer may sell the shares so loaned, or upon default, the broker-dealer may sell the pledged shares pursuant to this prospectus.

Broker-dealers or agents may receive compensation in the form of commissions, discounts or concessions from the selling stockholder. Broker-dealers or agents may also receive compensation from the purchasers of the shares for whom they act as agents or to whom they sell as principal, or both. Compensation as to a particular broker-dealer might be in excess of customary commissions and will be in amounts to be negotiated in connection with the sale. Broker-dealers or agents and any other participating broker-dealers or the selling stockholders may be deemed to be underwriters within the meaning of Section 2(11) of the Securities Act of 1933 (the Securities Act) in connection with sales of the shares. Accordingly, any such commission, discount or concession received by them and any profit on the resale of the shares purchased by them may be deemed to be underwriting discounts or concessions under the Securities Act.

The selling stockholders and any broker-dealers, agents or underwriters that participate with the selling stockholders in the distribution of the issued and outstanding shares of common stock may be deemed to be underwriters within the meaning of the Securities Act, in which event any commissions received by these broker-dealers, agents or underwriters and any profits realized by the selling stockholders on the resales of the securities may be deemed to be underwriting commissions or discounts under the Securities Act. If the selling stockholders are deemed to be underwriters, the selling stockholders may be subject to certain statutory and regulatory liabilities, including liabilities imposed pursuant to Sections 11, 12 and 17 of the Securities Act and Rule 10b-5 under the Securities Exchange Act of 1934. In addition, because the selling stockholders may be deemed an underwriter within the meaning of Section 2(11) of the Securities Act, the selling stockholders may be subject to the prospectus delivery requirements of the Securities Act.

Any shares covered by the registration statement, of which this prospectus is a part, that qualify for sale pursuant to Rule 144 under the Securities Act may be sold under Rule 144 rather than pursuant to this prospectus. The shares will be sold only through registered or licensed brokers or dealers if required under applicable state securities laws. In addition, in certain states the shares may not be sold unless they have been registered or qualified for sale in the applicable state or an exemption from the registration or qualification requirement is available and is complied with.

We will bear all costs, expenses and fees in connection with the registration of the shares, including registration and filing fees, printing and duplication expenses, administrative expenses, legal fees and accounting fees. If the shares are sold through underwriters or broker-dealers, the selling stockholders will be responsible for underwriting discounts, underwriting commissions and agent commissions. The selling stockholders may agree to indemnify any broker-dealer or agent that participates in transactions involving sales of the shares against certain liabilities, including liabilities arising under the Securities Act. We have agreed to indemnify the selling stockholders against specified liabilities, including specified liabilities under the Securities Act, and such selling stockholders agreed to indemnify us against certain liabilities, including liabilities under the Securities Act. The selling stockholders may sell all, some or none of the shares offered by this prospectus or interests therein.

LEGAL MATTERS

Greenberg Traurig, LLP has opined as to the validity of the securities being offered by this prospectus.

EXPERTS

The consolidated financial statements of Spire Corporation as of December 31, 2005 and for each of the two years in the period ended December 31, 2005, incorporated by reference in this prospectus and elsewhere in the Registration Statement, have been audited by Vitale, Caturano & Company, Ltd., an independent registered public accounting firm, as indicated in their report with respect thereto, and are incorporated by reference herein in reliance upon the authority of said firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We file reports, proxy statements and other documents with the SEC. You may read and copy any document we file at the SEC's public reference room at 100 F Street, N.E., Room 1580, Washington, DC 20549. You should call 1-800-SEC-0330 for more information on the operation of the public reference room. Our SEC filings are also available to you on the SEC's Internet site at <http://www.sec.gov>. The SEC's Internet site contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

This prospectus is part of a registration statement that we filed with the SEC. The registration statement contains more information than this prospectus regarding us and our common stock, including certain exhibits and schedules. You can obtain a copy of the registration statement from the SEC at the address listed above or from the SEC's Internet site.

Our Internet address is www.spirecorp.com. The information on our Internet website is not incorporated by reference in this prospectus.

INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The SEC allows us to incorporate into this prospectus information that we file with the SEC in other documents. This means that we can disclose important information to you by referring to other documents that contain that information. Any information that we incorporate by reference is considered part of this prospectus. The documents and reports that we list below are incorporated by reference into this prospectus. In addition, all documents and reports which we file pursuant to Section 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934 after the date of this prospectus are incorporated by reference in this prospectus as of the respective filing dates of these documents and reports. Statements contained in documents that we file with the SEC and that are incorporated by reference in this prospectus will automatically update and supersede information contained in this prospectus, including information in previously filed documents or reports that have been incorporated by reference in this prospectus, to the extent the new information differs from or is inconsistent with the old information.

We have filed the following documents with the SEC. These documents are incorporated herein by reference as of their respective dates of filing:

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- (1) Our Annual Report on Form 10-K for the fiscal year ended December 31, 2005;
- (2) Our Current Report on Form 8-K, dated April 26, 2006, filed with the SEC on May 1, 2006;
- (3) All of our filings pursuant to the Exchange Act after the date of filing the initial registration statement and prior to the effectiveness of the registration statement; and
- (4) The description of our common stock contained in our Registration Statement on Form 8-A, including any amendments or reports filed for the purpose of updating that description.

You may request a copy of these documents, which will be provided to you at no cost, by contacting:

Spire Corporation

One Patriots Park

Bedford, MA 01730

Attn: Investor Relations Department

(781) 275-6000

You should rely only on the information contained in this prospectus, including information incorporated by reference as described above, or any prospectus supplement that we have specifically referred you to. We have not authorized anyone else to provide you with different information. You should not assume that the information in this prospectus or any prospectus supplement is accurate as of any date other than the date on the front of those documents or that any document incorporated by reference is accurate as of any date other than its filing date. You should not consider this prospectus to be an offer or solicitation relating to the securities in any jurisdiction in which such an offer or solicitation relating to the securities is not authorized. Furthermore, you should not consider this prospectus to be an offer or solicitation relating to the securities if the person making the offer or solicitation is not qualified to do so, or if it is unlawful for you to receive such an offer or solicitation.

