

SPIRE CORP
Form 424B3
April 30, 2008

Filed Pursuant to Rule 424(b)(3)

Registration No. 333-150272

PROSPECTUS

Spire Corporation

\$60,000,000 of Common Stock Offered by Spire Corporation

1,113,585 Shares of Common Stock Offered by Selling Stockholder

We may offer and sell shares of our common stock, from time to time, to or through one or more underwriters, dealers and agents, or directly to purchasers, on a continuous or delayed basis, at prices and on other terms to be determined at the time of offering, up to a total dollar amount of \$60,000,000. We will provide more specific terms of such offering and sale of our common stock in supplements to this prospectus.

In addition, the selling stockholder identified in this prospectus, and any of its pledgees, donees, transferees or other successors in interest, may offer and sell up to 1,113,585 shares of our common stock from time to time under this prospectus and any prospectus supplement. The selling stockholder may offer and sell such shares to or through one or more underwriters, dealers and agents, or directly to purchasers, on a continuous or delayed basis. The selling stockholder 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. We will not receive any of the proceeds from the sale of our common stock by the selling stockholder. The selling stockholder will pay all underwriting discounts and commissions, if any, in connection with the sale of the selling stockholder's shares. See Selling Stockholder and Plan of Distribution.

Our common stock is traded on the Nasdaq Global Market under the symbol SPIR. On April 10, 2008, the closing sale price of the common stock on Nasdaq was \$17.78 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 3.

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 April 28, 2008

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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.

Important Notice about the Information Presented in this Prospectus

You should rely only on the information contained or incorporated by reference in this prospectus or any applicable prospectus supplement. Neither we nor the selling stockholder have authorized any other person to provide you with different information. If anyone provides you with different or inconsistent information, you should not rely on it. For further information, see the section of this prospectus entitled "Where You Can Find More Information." Neither we nor the selling stockholder are making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted.

You should not assume that the information appearing in this prospectus or any applicable prospectus supplement is accurate as of any date other than the date on the front cover of this prospectus or the applicable prospectus supplement, or that the information contained in any document incorporated by reference is accurate as of any date other than the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any prospectus supplement or any sale of a security. Our business, financial condition, results of operations and prospects may have changed since such dates.

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

ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement filed with the Securities and Exchange Commission utilizing a shelf registration process. Under this shelf registration process, we may sell shares of common stock in one or more offerings up to a total dollar amount of \$60,000,000 and the selling stockholder may, from time to time, sell up to 1,113,585 shares of common stock in one or more offerings.

This prospectus provides you with a general description of the securities we may offer. Each time we sell securities, we will provide a prospectus supplement that will contain specific information about the terms of that specific offering. The prospectus supplement may also add to, update or change information contained in this prospectus. You should read both this prospectus and any prospectus supplement together with the additional information described under the heading **Where You Can Find More Information**.

ABOUT SPIRE CORPORATION

We principally develop, manufacture and market customized turnkey solutions for the solar industry, including manufacturing equipment and full turnkey lines for cell and module production and testing. We also offer through our subsidiary Spire Semiconductor concentrator cell and light-emitting diode (LED) fabrication services and through our joint venture Gloria Spire Solar photovoltaic (PV) system integration services. We also operate a line of business associated with advanced biomedical applications. The foundation for our business is our industry-leading expertise in materials technologies and surface treatments; this proprietary knowledge enables us to further develop our offerings in solar equipment, optoelectronics and biomedical products and services.

Our initial focus on high-energy physics led to the development of our first product, the SPI-PULSE electron beam generator, to support research in radiation effects testing. We moved into the space solar cell business after signing a contract to develop solar cell coverslip for radiation hardening. In addition, we began to develop a new technology based on ion implantation and pulsed electron beam annealing of silicon solar cells. As a result of the energy crisis in the early 1980s, which forced the United States to consider photovoltaics for terrestrial applications, we received our first terrestrial solar cell contract for low cost production using our ion implantation technology. We leveraged this knowledge to develop our state-of-the-art manufacturing equipment, in addition to our offerings in the optoelectronics and biomaterials industries.

As photovoltaic cell and module manufacturers ramp production to meet increasing demand, they will first need to acquire greater quantities of turnkey equipment in order to produce more photovoltaic cells and modules. We believe that we are one of the world's leading suppliers of the manufacturing equipment and technology needed to produce solar photovoltaic power systems. Our individual manufacturing equipment products and our SPI-LINE™ integrated turnkey cell and module production lines can be highly scaled, customized, and automated with high throughput. These systems are designed to meet the needs of a broad range of customers ranging from manufacturers relying on mostly manual processes, to some of the largest photovoltaic manufacturing companies in the world.

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In addition to our cell and module manufacturing solutions, we have a device fabrication facility where we produce, under contract with our customers, gallium arsenide (GaAs) concentrator cells. The state-of-the-art semiconductor fabrication and foundry facility is the foundation of our solar cell process technology for silicon, polysilicon, thin film and GaAs concentrator cells. Under the name Spire Semiconductor, this division produces GaAs concentrator cells, high performance LEDs, and other custom semiconductor foundry services for our customers.

In July 2007, we entered into a joint venture with Gloria Solar Co., Ltd., a leading cell and module manufacturer in Taiwan, which designs, sells and manages installations of photovoltaic systems. Our 45% ownership stake in the joint venture, Gloria Spire Solar, LLC, was obtained through the contribution of our building integrated photovoltaic business to Gloria Solar. This transaction has allowed us to focus more of our attention on our core solar business, while

continuing to expand the Spire brand name in the marketplace.

Capitalizing on our expertise in surface treatments, we also have a biomedical division which manufactures medical devices and provides advanced medical device surface treatment processes to our customers. Our medical device business develops, manufactures and sells premium products for vascular access in chronic kidney disease patients. Our surface treatment business modifies the surfaces of medical devices to improve their performance.

We have been in the solar business for over 30 years and have been active in research and development in the space, with over \$100 million of research and development conducted which has led to over 60 patents granted to date, as well as cell and module production, having been a pioneer in the early development of solar technology. This expertise has provided the platform and expertise for our manufacturing equipment. We have equipment deployed in approximately 50 countries.

Our common stock is quoted on the Nasdaq Global Market under the symbol SPIR. Our executive offices are located at One Patriots Park, Bedford, Massachusetts 01730, our telephone number is (781) 275-6000.

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 continued 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 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.

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

We have experienced losses from operations in each of the past two fiscal years. These losses have contributed to an accumulated deficit of approximately \$11.4 million as of December 31, 2007. Our revenues have not been sufficient to cover our operating expenses, and we anticipate that we may sustain future losses from operations if revenues do not increase. 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 processed by the capital equipment we provide to our buyers, particularly the polysilicon used in the manufacture of the silicon wafers and solar cells;
- 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;

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- Changes in our receipt of license fees, milestone payments and royalty payments relating to our intellectual property;
- 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;
- 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;

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- 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;
- Termination of existing grants with government agencies or delays in funding of grants awarded;
- Delays in introducing and gaining physician acceptance for new products and product improvements, particularly in our biomedical products business; and
- Disruption in the distributor sales channels by which we bring our biomedical products to market.

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. Even if we are profitable, we may require additional working capital to meet expected growth. Although future sales of technology licenses may be pursued, such sales cannot be assured. In addition, we may need to raise additional capital, or arrange other sources of funds, in order to sustain our operations. There can be no assurance that we will be able to raise such funds if they are required. Even if new financing were available, it may not be on commercially reasonable terms or terms that are acceptable to us.

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.

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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 made a substantial investment in equipment at Spire Semiconductor in anticipation of future revenues under its agreement with Principia Lightworks. If these anticipated revenues are not achieved, we will have significant unutilized capacity and may not recover our investment in the equipment.

We have not consistently complied with Nasdaq's marketplace rules for continued listing, which exposes us to the risk of delisting from the Nasdaq Global Market.

Our stock is currently listed on the Nasdaq Global 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 its continued listing on the Nasdaq Global 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 Global 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, 2007, we were not in compliance with the minimum stockholders' equity threshold. As a result, we do not meet Standard No. 1 for continued listing on the Nasdaq Global Market. However, we believe that we do meet Standard No. 2 for continued listing on the Nasdaq Global Market as the market value of our listed securities currently exceeds \$50,000,000 and we meets all of the other requirements of Standard No. 2. In order to remain in compliance with Standard No. 2, our market value of 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 Global 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 Global 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.

We had one customer that accounted for more than 10% of consolidated net sales and revenues during the year ended December 31, 2007 (approximately 15%), and one customer that accounted for more than 10% consolidated net sales and revenues in 2006 (approximately 12%). In addition, we have had such customers in other years 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.

- 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 35 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.

From time to time we may be subject to lawsuits by other parties seeking to enforce their intellectual property rights.

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

Substantially most 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 United States 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. 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;
- The temporary or permanent unavailability of, or delays in obtaining, access to key process technologies; and
- Dependence on single source contractors to provide critical services.

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 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 45% and 33% of net sales and revenues for 2007 and 2006, respectively). Over 90% of export sales in 2007 and 2006 were to solar equipment customers with the remainder to biomedical and optoelectronic related customers. Spain and Taiwan were the only foreign countries that accounted for more than 10% of sales in 2007 and Germany was the only foreign country that accounted for more than 10% of sales in 2006. Net sales to customers in Spain and Taiwan accounted for \$7,331,000 and \$5,208,000, respectively, in 2007 and net sales to customers in Germany accounted for \$2,568,000 in 2006. 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;
- Increased costs or reduced revenues as a result of movements in foreign currency exchange rates;

- 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.

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. We have had cases brought against us in which it was alleged that we have been a party to the manufacture and sale of defective heart valves with other defendants. We reached a settlement in a case alleging that our

catheter contributed to a patient's death in Ohio. 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 principal stockholder.

Roger G. Little, our founder, Chairman of the Board, Chief Executive Officer and President, controls approximately 26% 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 our Company that may be otherwise viewed as beneficial by shareholders other than Mr. Little.

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

We have paid no cash dividends since our inception. We anticipate retaining any future earnings for reinvestment in operations and do not anticipate that dividends will be paid in the foreseeable future. Accordingly, 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 our company 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.

Our joint venture transaction with Gloria Solar may not realize all of its intended benefits.

On September 4, 2007, we closed a contractual relationship with Gloria Solar. Pursuant to this transaction, among other things, we formed a joint venture, owned 55% by Gloria Solar and 45% by us, for the purpose of pursuing the solar photovoltaic systems market within the United States. The joint venture will design, market, sell and manage the installation of systems for the generation of electrical power by solar photovoltaic means in primarily commercial/industrial and utility segments of such market (the JV Systems Business). In connection with the formation of the joint venture, (i) we contributed to the joint venture our assets primarily relating to the JV Systems Business,

including certain intellectual property and know-how, access to information technology assets and relationships, relationships with current and previous customers, contract backlog and project opportunities, certain registered trademarks, and employment relationships with staff members and (ii) Gloria Solar contributed \$5,000,000 in cash. In connection with the establishment of the joint venture, we may experience:

- difficulties in integrating our and Gloria Solar's respective corporate cultures and business objectives into the new joint venture;
- diversion of our management's time and attention from other business concerns;
- higher than anticipated costs of integration at the joint venture;
- difficulties in retaining key employees who are necessary to manage the joint venture; or
- difficulties in working with an entity based in Taiwan and thus remote or inconvenient to our Bedford, Massachusetts headquarters.

For any of these reasons or as a result of other factors, we may not realize the anticipated benefits of the joint venture, and cash flow or profits derived from our ownership interest in the joint venture may be less than the cash flow or profits that could have been derived had we retained the transferred assets and continued to operate the JV Systems Business ourselves. Either party has the right, at any time upon certain material breaches by the other party of obligations under the joint venture documents, to acquire all of the breaching party's interest in the joint venture at 90% fair market value. In addition, in the event of a change in control of a member, the other members may purchase such member's interest in the joint venture at fair market value. Furthermore, our further participation in the business of the joint venture is restricted; for a period of three (3) years, we may not mass manufacture, market or sell solar cell modules with less than 575 watt capacity, and may do so thereafter only outside the United States.

Some of the requirements of Sarbanes-Oxley affect us as a small company disproportionately, and we may not be able to comply in a timely manner despite substantial effort and expense.

The Sarbanes-Oxley Act of 2002 imposed many new requirements on public companies, the most significant of which involves the documentation, testing and reporting of the effectiveness of our internal control over financial reporting.

We reported on our assessment of the effectiveness of our internal control over financial reporting to be in compliance with Section 404 of Sarbanes-Oxley, in our annual report for the year ended December 31, 2007. We have documented and tested our internal controls in 2007 and this effort involved substantial time and expense. We have identified material weaknesses, as discussed below, from our internal review and our registered public accounting firm has also identified items in its annual audit of our consolidated financial statements.

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Based on this evaluation, management concluded that the following material weaknesses in internal control over financial reporting existed as of December 31, 2007: we did not have a sufficient level of staffing with the necessary knowledge, experience and training to ensure the completeness and accuracy of our financial statements. Additionally, our internal policies and procedures related to internal control over financial reporting were not effective. As a result of this material weakness, adjustments related to the accounting for inventory, accruals, reserves, income taxes and revenues were recorded to properly state the 2007 fiscal year consolidated financial statements. These items were corrected prior to the finalization of those financial statements. For more detailed information see Item 9A(T). Controls and Procedures of our Annual Report on Form 10-K for the year ended December 31, 2007.

We are working to address the issues raised by this material weakness, but we may not be successful in remediating them in a timely manner.

Our credit agreements with Silicon Valley Bank subjects us to various restrictions, which may limit our ability to pursue business opportunities.

Our credit agreements with Silicon Valley Bank subjects us to various restrictions on our ability to engage in certain activities without the prior written consent of the bank, including, among other things, our ability to:

- dispose of or encumber assets, other than in the ordinary course of business,
- incur additional indebtedness,
- merge or consolidate with other entities, or acquire other businesses, and
- make investments

The agreements also subject us to various financial and other covenants with which we must comply on an ongoing or periodic basis. For example under our equipment line, as long as any commitment remains outstanding under the facility, we must comply with an adjusted quick ratio covenant and a rolling six month average minimum net income covenant. If we violate these or any other covenant, any outstanding debt under these agreements could become immediately due and payable, the bank could proceed against any collateral securing indebtedness and our ability to borrow funds in the future may be restricted or eliminated. These restrictions may also limit our ability to pursue business opportunities or strategies that we would otherwise consider to be in the best interests of the company.

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 (the Exchange Act). 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 currently intend to use the net proceeds from the sale of any shares of common stock by us under this prospectus for general corporate purposes, which may include:

- working capital;
- the repayment of debt; and
- the financing of potential investments, including the acquisition of assets, businesses or securities; and
- other purposes as mentioned in any prospectus supplement.

Pending such use, we may temporarily invest the net proceeds. The precise amounts and timing of the application of proceeds will depend upon our funding requirements and the availability of other funds. Except as mentioned in any prospectus supplement, specific allocations of the proceeds to such purposes will not have been made at the date of that prospectus supplement.

We will not receive any proceeds from the sale of shares by the selling stockholder.

SELLING STOCKHOLDER

The Roger G. Little Family Trust, or the Trust, is the selling stockholder. Roger G. Little, our Chairman, Chief Executive and President, is the sole trustee and beneficiary of the Trust (during his lifetime).

The following table sets forth the number of shares of common stock beneficially owned by the selling stockholder as of March 28, 2008, the number of shares of common stock covered by this prospectus on behalf of the selling stockholder and the total number of shares of common stock that the selling stockholder will beneficially own upon completion of this offering. This table assumes that the selling stockholder will offer for sale all of the shares of common stock covered by this prospectus.

The common stock may be offered under this prospectus from time to time by the selling stockholder, or by any of its pledgees, donees, transferees or other successors in interest. The amounts set forth below are based upon information provided to us by the selling stockholder, or on our records, as of March 28, 2008, and are accurate to the best of our knowledge. It is possible, however, that the selling stockholder may acquire or dispose of additional shares of common stock from time to time after the date of this prospectus.

The selling stockholder will pay the SEC registration fee associated with the selling stockholder's shares and any underwriting discounts and commissions and expenses incurred by the selling stockholder for brokerage, accounting, tax or legal services or any other expenses incurred by the selling stockholder 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, fees and expenses of our counsel and our accountants.

Name of Selling Stockholder	Common Stock Beneficially Owned as of 03/28/08	Common Stock Offered Hereby	Common Stock to be Beneficially Owned After Offering (1)	
			Number	Percentage (2)
The Roger G. Little Family Trust (3)	2,152,355	1,113,585	1,038,770	12.5%

(1) We do not know when or in what amounts the selling stockholder may offer shares for sale. The selling stockholder may not sell any or all of the shares offered by this prospectus. Because the selling stockholder 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 stockholder 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 stockholder.

(2) Based on 8,328,688 shares of our common stock outstanding as of March 28, 2008.

(3) Roger G. Little has voting and investment control over securities held by The Roger G. Little Family Trust.

PLAN OF DISTRIBUTION

We or the selling stockholder may sell the securities from time to time pursuant to underwritten public offerings, negotiated transactions, block trades or a combination of these methods. We or the selling stockholder may sell the securities through underwriters or dealers, through agents, or directly to one or more purchasers. We or the selling stockholder may distribute securities from time to time in one or more transactions:

- at a fixed price or prices, which may be changed;
- at market prices prevailing at the time of sale;
- at prices related to such prevailing market prices; or
- at negotiated prices.

A prospectus supplement or supplements will describe the terms of the offering of the securities, including:

- the name or names of any underwriters, if any;
- the purchase price of the securities and the proceeds we will receive from the sale;
- any over-allotment options under which underwriters may purchase additional securities from us;
- any agency fees or underwriting discounts and other items constituting agents or underwriters compensation;
- any public offering price;
- any discounts or concessions allowed or reallocated or paid to dealers; and

- any securities exchange or market on which the securities may be listed.

Only underwriters named in the prospectus supplement are underwriters of the securities offered by the prospectus supplement.

If underwriters are used in the sale, they will acquire the securities for their own account and may resell the securities from time to time in one or more transactions at a fixed public offering price or at varying prices determined at the time of sale. The obligations of the underwriters to purchase the securities will be subject to the conditions set forth in the applicable underwriting agreement. We or the selling stockholder may offer the securities to the public through underwriting syndicates represented by managing underwriters or by underwriters without a syndicate. Subject to certain conditions, the underwriters will be obligated to purchase all of the securities offered by the prospectus supplement, other than securities covered by any over-allotment option. Any public offering price and any discounts or concessions allowed or reallocated or paid to dealers may change from time to time. We or the selling stockholder may use underwriters with whom we have or the selling stockholder has a material relationship. We will describe in the prospectus supplement, naming the underwriter, the nature of any such relationship.

We or the selling stockholder may sell securities directly or through agents we designate from time to time. We will name any agent involved in the offering and sale of securities and we will describe any commissions we or the selling stockholder will pay the agent in the prospectus supplement. Unless the prospectus supplement states otherwise, any such agent will act on a best-efforts basis for the period of its appointment.

We or the selling stockholder may authorize agents or underwriters to solicit offers by certain types of institutional investors to purchase securities from us or from the selling stockholder at the public offering price set forth in the prospectus supplement pursuant to delayed delivery contracts providing for payment and delivery on a specified date in the future. We will describe the conditions to these contracts and the commissions we or the selling stockholder must pay for solicitation of these contracts in the prospectus supplement.

We or the selling stockholder may provide agents and underwriters with indemnification against civil liabilities, including liabilities under the Securities Act, or contribution with respect to payments that the agents or underwriters may make with respect to these liabilities. Agents and underwriters may engage in transactions with, or perform services for, us or the selling stockholder in the ordinary course of business.

Any underwriter may engage in overallotment, stabilizing transactions, short covering transactions and penalty bids in accordance with Regulation M under the Exchange Act. Overallotment involves sales in excess of the offering size, which create a short position. Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum price. Short covering transactions involve purchases of the securities in the open market after the distribution is completed to cover short positions. Penalty bids permit the underwriters to reclaim a selling concession from a dealer when the common stock originally sold by the dealer is purchased in a covering transaction to cover short positions. Those activities may cause the price of the common stock to be higher than it would be otherwise. If commenced, the underwriters may discontinue any of the activities at any time.

Any underwriters that are qualified market makers on the Nasdaq Global Market may engage in passive market making transactions in the common stock on the Nasdaq Global Market in accordance with Regulation M under the Exchange Act, during the business day prior to the pricing of the offering, before the commencement of offers or sales of the common stock. Passive market makers must comply with applicable volume and price limitations and must be identified as passive market makers. In general, a passive market maker must display its bid at a price not in excess of the highest independent bid for such security; if all independent bids are lowered below the passive market maker's bid, however, the passive market maker's bid must then be lowered when certain purchase limits are exceeded.

In addition, we and the selling stockholder will be subject to applicable provisions of the Exchange Act and the associated rules and regulations under the Exchange Act, including Regulation M, which provisions may limit the timing of our and the selling stockholder's purchases and sales of the shares. We will make copies of this prospectus available to the selling stockholder and have informed it of the need for delivery of copies of this prospectus to purchasers at or prior to the time of any sale of the shares.

Certain underwriters, dealers or agents and their associates may engage in transactions with and perform services for us or the selling stockholder in the ordinary course of our business.

In connection with the sale of shares or interests therein, the selling stockholder may enter into hedging transactions with broker-dealers or other financial institutions, which may, in turn, engage in short sales of shares of common stock in the course of hedging the positions they assume. The selling stockholder may also sell shares of our common stock short and deliver shares to close out its short positions provided it has met its prospectus delivery obligations at the time of the short sale. The selling stockholder may also loan or pledge shares to broker-dealers that in turn may sell the shares offered hereby. The selling stockholder may also enter into option or other transactions with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction). The selling stockholder may also sell the shares in privately negotiated transactions, through block trades in which the broker-dealer will attempt to sell the shares as agent but may position and resell a portion of the block as principal to facilitate the transaction, through an exchange distribution in accordance with the rules of the applicable exchange, ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers, to broker-dealers who may agree with the selling stockholder to sell a specified number of such shares at a stipulated price per share or a combination of any of the foregoing methods described in this paragraph.

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The selling stockholder also may resell all or a portion of the shares in open market transactions in reliance upon Rule 144 under the Securities Act, provided that it meets the criteria and those sales conform to the requirements of that rule.

From time to time, the selling stockholder may pledge or grant a security interest in some or all of the shares that it owns and, if it defaults in the performance of its secured obligations, the pledgees or secured parties may offer and sell some or all of the shares from time to time under this prospectus or an amendment to this prospectus under Rule 424(b)(3) of the Securities Act, or another applicable provision of the Securities Act, which amends the list of selling stockholders to include the pledgees, transferees or other successors-in-interest as the selling stockholder under this prospectus.

The selling stockholder also may transfer the shares in other circumstances, in which case the transferees, pledgees, donees or other successors-in-interest will be the reselling beneficial owners for purposes of this prospectus.

To the extent required pursuant to Rule 424(b) of the Securities Act, or other applicable rule, upon being notified by the selling stockholder that any material arrangement has been entered into with a broker-dealer for the sale of the shares through a block trade, special offering, exchange distribution or secondary distribution or purchase by a broker or dealer, we will file a supplement to this prospectus. Such supplement will disclose:

- the name of the participating broker-dealer(s);
- the number of shares involved;
- the price at which such 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.

The selling stockholder will pay the SEC registration fee associated with the selling stockholder's shares and any underwriting discounts and commissions and expenses incurred by the selling stockholder for brokerage, accounting, tax or legal services or any other expenses incurred by the selling stockholder 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, fees and expenses of our counsel and our accountants.

EXPERTS

The consolidated financial statements of Spire Corporation as of December 31, 2006 and 2007 and for each of the two years in the period ended December 31, 2007, 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.

LEGAL MATTERS

Certain legal matters, including the legality of the securities offered, will be passed upon for us by our counsel, Greenberg Traurig, LLP, Boston, Massachusetts.

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 securities, 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 Exchange Act 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:

- (1) Our Annual Report on Form 10-K for the fiscal year ended December 31, 2007;
- (2) Our Current Report on Form 8-K filed with the SEC on April 4, 2008;
- (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

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(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.