MFIC CORP
Form 10-K
April 06, 2004

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF

THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2003

Commission File Number: 0-11625

MFIC CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**04-2793022**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
30 Ossipee Road, P.0. Box 9101 Newton, Massachusetts	**02464-9101**
(Address of principal executive offices)	(Zip Code)

Registrant s telephone number, including area code: **(617) 969-5452**

Securities registered pursuant to Section 12(b) of the Act: **None**

Securities registered pursuant to Section 12(g) of the Act: **Common Stock, $.01 par value**

Indicate by check mark whether the registrant; (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes ý No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o

The aggregate market value of Common Stock held by non-affiliates of the registrant (without admitting that any person whose shares are not included in determining such value is an affiliate), based upon the closing sale price of the Common Stock on March 31, 2004 as reported on the NASDAQ Over-the-Counter Bulletin Board was $27,121,627.

The number of shares outstanding of the registrant s Common Stock as of March 31, 2004 was 10,802,494 shares.

MFIC Corporation

2003 Form 10-K Annual Report

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This Report contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Such statements are subject to certain risks and uncertainties, including without limitation those discussed in Item 7 under the heading Factors which may affect future operations. Such forward-looking statements speak only as of the date on which they are made, and the Company cautions readers not to place undue reliance on such statements.

Microfluidizer® is a trademark of the Company, which has been registered with the United States Patent and Trademark Office. Microfluidics™ is a trademark of the Company for which a registration application has been filed with the United States Patent and

Trademark Office. All other trademarks or trade names referred to herein are the property of their respective owners.

Item 1. BUSINESS

Company Overview:

MFIC Corporation (MFIC or the Company), through its wholly-owned subsidiary, Microfluidics Corporation (Microfluidics Division), specializes in manufacturing and marketing a broad line of Microfluidizer® high shear fluid materials processing systems used in numerous applications in the coatings, pharmaceutical, biotech, food, and cosmetics industries. Microfluidizer® high shear fluid processor systems are produced at the Microfluidics Division. Until its sale on February 9, 2004, the Company operated its Morehouse-COWLES Division which manufactured and sold a broad line of mechanical fluid materials processing systems used for a variety of grinding, dispersing, milling, and blending applications across a variety of industries. The Morehouse-COWLES Division manufactured and distributed high shear dispersers, dissolvers, colloid mills, horizontal media mills, vertical media mills, and sold grinding media for such equipment.

For almost 20 years MFIC has offered Microfluidizer® high shear fluid processor equipment capable of creating nanostructures (commonly defined as having dimensions in the 10-1000 nanometer range), including nanoparticles, microemulsions, and nanosuspensions. The equipment s ability to produce commercial quantities of such materials has been important to producers of pharmaceuticals, coatings and in other industries. The Company s management believes that future commercialization and growth of nanotechnology will be, enabled in large part, by such manufacturing capability.

Microfluidizer® fluid processing equipment is used by industry to formulate stable emulsions, dispersions, and liposomes, and is used in general for deagglomeration and for cell disruption in the biotech industry and for liposomal encapsulation. Emulsions are found in a broad variety of common products, including processed foods, pharmaceuticals, and specialty coatings such as photographic films. Dispersions are often employed in products such as pharmaceuticals, inks, pigments and coatings. The Company believes that the processing technique of the Microfluidizer® equipment enhances the stability and consistency of emulsions and dispersions due to the equipment s unique ability to consistently produce uniform micron and sub-micron scale particles in many applications. Liposomes, which are biodegradable cell-like structures, are used to encapsulate medications or nutrients, and are typically used in cosmetic or pharmaceutical products. In addition, Microfluidizer® processor equipment is used in biotechnology applications to harvest, through cell disruption, the cultivated product contents of plant and animal cells. The design and operation of the Microfluidizer® systems with its patented and proprietary fixed geometry interaction chamber results in consistent, uniform and reproducible results. Further, the Company guarantees scaleup of formulations and results on its equipment from drops per minute on its laboratory and bench top models to gallons per minute on its production models. In many critical formulations Microfluidizer® processors produce better quality products for our customers. Further, the proprietary equipment enables manufacture of unique products which cannot otherwise be produced.

The Company s product lines are used to create stable emulsions and dispersions through deagglomeration and particle size reduction. These formulations may be liquid/liquid or liquid/solid formulations and are generally prepared in quantities ranging from less than one gallon to several thousand gallons in an industrial environment.

The Microfluidizer® equipment is generally used in the processing of high value-added end-products that require extremely small particle sizes.

The Company was incorporated in Delaware in 1983. The Company, formerly named Biotechnology Development Corporation, changed its name effective June 8, 1993 to Microfluidics International Corporation, and again changed its name effective July 12, 1999 to MFIC Corporation. Its principal executive offices are located at 30 Ossipee Road, in Newton, Massachusetts, 02464-9101 and its telephone number is (617) 969-5452.

The Technology:

The Company s Microfluidizer® materials processor equipment is based on patents and related technology that were licensed by the Company from Arthur D. Little & Co. in 1983 and subsequently purchased by the Company in 1985. The Company holds two United States patents related to the apparatus and process used to intimately mix liquids and disperse particulate solids in microemulsions. See Patents and Proprietary Rights Protection.

The Microfluidizer® material processor differs from conventional mechanical mixing and processing technologies in that it utilizes highly pressurized product streams that travel in precisely defined microchannels and collide at ultra-high velocities in a small, confined space. There are no moving parts in this mixing and collision zone (Fixed Geometry) Combined forces of shear and impact which on the fixed geometry design acts upon products to create what the Company believes are finer, more uniform, and more reproducible dispersions and emulsions than can be produced by any other means.

The Company s Microfluidizer® processor technology is used in materials processing and product formulation to mix materials that are normally very difficult to mix. The Microfluidizer® processor technology allows manufacturers in the chemical, pharmaceutical, biotechnology, cosmetic, and food processing industries to produce higher quality products with better characteristics on a more consistent basis than with other blending, mixing, or homogenizing techniques. Additionally, the equipment is used for cell disruption to harvest the cultivated contents of animal and/or plant cells and for liposomal encapsulation of materials for the cosmetics and biotech/ biopharma industry.

Commercial Applications:

The Microfluidizer® equipment can be used to mix and formulate stable emulsions, dispersions and liposomes, and for cell disruption.

Emulsions are homogenous mixtures of oil and water components (or other normally immiscible components), which, if mixed properly, do not readily separate. Emulsions comprise many products, such as food additives, medicines (including injectable drugs), photographic films, and polymers. The Company believes that, generally, an emulsion processed with Microfluidizer® equipment will exhibit improved stability and require reduced concentrations of costly emulsifying agents that are otherwise needed to enhance product stability.

Dispersions are mixtures of fine solids suspended in liquid so that the two do not separate readily after processing. Similar to emulsions, dispersions are used in a variety of consumer and industrial products, including pigments, medicines (including injectable drugs), paints and inks, iron oxide for magnetic tapes, phosphorescent coatings for TV screens and fluorescent lamps, barium titanate for capacitors, toners and inkjet inks.

Liposomes are biodegradable cell-like structures, formed from materials such as cholesterol and lecithin, which can be used to encapsulate medications or nutrients. Pharmaceutical and cosmetic manufacturers use liposomes as a delivery system to target active ingredients for specific anatomical sites and to prolong their efficacy. To date, liposomes have been used commercially in two predominant applications: medical diagnostic agents and cosmetics. Applications include the encapsulation of dye to be used as a marker in medical diagnostic tests and the encapsulation of ingredients for deeper skin penetration, or time-release control, as well as pharmaceutical, food and specialized agricultural applications.

In the biotechnology industry, Microfluidizer® equipment is currently used to harvest, by cell rupture, the contents of bacteria and mammalian plant or animal cells. The precision with which the Microfluidizer® equipment can be used to break up materials allows the encapsulating cell wall to be ruptured without damage to or contamination of the cell contents. The Microfluidizer® equipment minimizes the amount and presence of cell wall debris and eliminated grinding media contamination, thus minimizing downstream processing requirements.

The Microfluidizer® equipment is generally used in commercial applications where a scientist, formulator or chemist is trying to develop or improve a product formulation for an expensive, high value-added end product. Microfluidizer® equipment is initially employed in a research laboratory, with the equipment subsequently being used in scaleup to pilot scale production of new or improved products, and ultimately, for full production scale volumes as the improved product comes to market. From laboratory to production, it has been demonstrated that the volume of products processed range from less than one quarter of a gallon per minute to 18 gallons per minute.

The Company currently manufactures and markets the following lines of equipment:

The HC Series: The HC Series, also known as Homogenizers, is a laboratory-scale series of equipment that is intended to impart moderate levels of energy into a customer s product with greater flow rates than the more energy intensive Microfluidizer® devices. Operating pressures of products in the Company s HC Series can range from under 500 psi to as high as 8,000 psi, and will process as much as two liters of fluid per minute.

The M-110 Series: The M-110 Series, is a laboratory product line that operates with available laboratory air and is designed primarily for research and development applications. Standard models can generate pressures as high as 25,000 psi and have a product flow rate on the order of one-half liter per minute. The M-110EH includes an on-board electric hydraulic pump system for high performance lab scale micro-mixing at processing pressures up to 25,000 psi and flow rates up to 450 ml/min. It has numerous standard features and options including explosion-proof motors and steam sterilization.

The M-140 Series: The M-140K Series, is a laboratory-scale unit developed for customers in the chemical, biotechnology, pharmaceutical, cosmetic and food processing industries that require elevated operating pressures and higher shear forces to achieve better performance. The M-140K can achieve operating pressures up to 40,000 psi. The M-140K has a built-in hydraulic system and utilizes a bi-directional intensifier pump that provides a highly uniform pressure profile. It has been designed with many accessories and options including an explosion proof motor, control package, and solvent seal quench.

The M-210 Series: The M-210 Series is a pilot unit and is primarily marketed to pharmaceutical, cosmetic and food product manufacturers who have created a successful new or improved formulation on the M-110 Series unit and would like to increase their production capacity. The M-210 Series unit is typically used for testing formulations at greater volume levels before initiating full-scale production. For some customers (such as pharmaceutical product manufacturers), the M-210 Series may have the capacity to function as a production unit.

The M-700 Series: The M-700 Series was introduced at the end of fiscal 1998 and was initially designed, engineered, and constructed for use in rugged industrial environments such as coatings, paints and pigments research and manufacturing. This product line was especially designed to

withstand such hazards as dust, grease, and water spray. Through use of our own proprietary designed intensifier pump and other components, the system has also proven to be more cost-effective in many user applications.

More recently, because of the market demands of the pharmaceutical, biotech and cosmetic industries, the M-700 product line was upgraded to all stainless steel construction, and meets Good Manufacturing Practices (GMP) requirements. (See discussion under heading Government Regulations .) It also offers steam in place (SIP) and clean in place (CIP) options.

The M-700 Series equipment is available in a variety of configurations and flow rates depending upon motor size and the number of intensifier pumps. On the low end of the spectrum is the 15 HP, single intensifier pump M-7115 machine with flow rates ranging from 1.0 gpm at 10,000 psi to 0.4 gpm at 30,000 psi. The next size up is the 25 HP, single intensifier pump, M-7125 machine with flow rates ranging from 2.0 gpm at 10,000 psi to 0.6 gpm at 30,000 psi. Until September 30, 2003, the largest offering of the M-700 series product line was the 50 HP, dual intensifier pump M-7250 machine with flow rates ranging from 4.0 gpm at 10,000 psi to 1.2 gpm at 30,000 psi.

On September 30, 2003, Microfluidics introduced a new addition to the M-700 series product line, the 100 HP, dual intensifier pump, Model M-710 machine with flow rates ranging from 12 gpm at 4,000 psi to 3.0 gpm at 30,000 psi. This model has the equivalent throughput of the larger and more expensive M-610-100 H.P model.

All M-700 series machines are offered with the capability of operating at 40,000 psi. Additionally, during 2003 the Company introduced several new options and equipment features to the M-700 series product offerings including:

(i) The M-700 Microfluidizer Containment System, which is utilized for the processing of highly toxic cancer drugs and other hazardous materials. The first such recently installed system is now producing pharmaceutical product.

(ii) The M-700 Microfluidizer Split System (separating the power source from the mixing/processing apparatus) accommodates demands of limited space within clean rooms and for noise abatement within pharmaceutical production facilities. In conjunction with this system, the Company also introduced a Level II Steam Sterility Option for all pilot and production systems used for production of injectable and other pharmaceuticals. This option enables compliance with stringent regulatory production requirements. The Company has delivered such a system to a pharmaceutical manufacturer.

(iii) Ultra Clean in Place (UCIP) option, which improves the ability to clean in place (CIP) Microfluidizer processor systems between product batch runs or before storage. This capability differentiates our Microfluidizer materials processor systems from all other competitive products. Several pilot and production systems incorporating this option have already been delivered.

The Company currently manufactures and markets the following lines of equipment:

The M-610 Series: The M-610 Series consists of custom-built models used for large-scale production. These units have flow rates of up to 18 gallons per minute and generate operating pressures up to 40,000 psi. Generally, these models are available in 25 HP, 50 HP, 75 HP, 100 HP, and 200 HP.

The Company currently manufactures and markets the following lines of equipment: 14

Multiple Stream Mixer/Reactor (MMR): The Company has introduced its patented Multiple Stream Mixer-Reactor (MMR) system as a continuous chemical reactor, which the Company believes may become a standard device for conducting chemical reactions, many of which can be configured to produce nanoparticles. This system produces uniform nanoparticles with phase purity previously unachievable with conventional batch reaction technology. This degree of reaction chemistry control can lead to cost-effective product improvements and the development and manufacture of new nanomaterials in scalable quantities. Applications for the new technology include improving the performance of catalysts, planarization polishing media, superconductors, abrasive silica, recording media, photographic media and pigments. It also may be used in the development and production of unique pharmaceutical products. The Company is proceeding with projects involving other companies seeking to optimize or enable drug delivery, catalysts and coatings products, as well as an internal program on nanopolymer creation for drug delivery and other applications. The Company anticipates making delivery of its first MMR laboratory development systems (in the $200,000-$250,000 sales price range) in 2004, with production systems (in the $750,000 - $1,500,000 sales price range) in 2005. The Company believes that the MMR systems and technology make it a leader in the provision of systems for continuous production of uniform, reproducible, microparticles, nanoparticles and nanodroplets.

Morehouse-COWLES Division:

On February 9, 2004, pursuant to an Asset Purchase Agreement (the Asset Purchase Agreement) dated February 5, 2004 between MFIC Corporation (MFIC) and a wholly owned subsidiary of NuSil Corportation, a California corporation (NuSil), MFIC sold substantially all of the assets and selected liabilities of its Morehouse-COWLES Division (the Division), to NuSil. Other than NuSil s prior purchases of products from the Division, there were no preexisting relationships between MFIC and NuSil.

Prior to February 9, 2004, the Company-operated Morehouse-COWLES Division manufactured grinding and dispersing equipment used in a broad number of industries including the coatings and ink industries. The products included high-speed single and multi-shaft dissolvers and dispersers, stone mills, and vertical and horizontal media mills. As one of the early inventors of dispersers, dissolvers, stone mills, and media mills, the one hundred-year-old COWLES name is an industry-accepted symbol of quality, reliable products. The Morehouse-COWLES Division manufactures products that are generally used for blending, mixing, deagglomeration and dispersion of paints and coatings, inks, adhesives, sealants, and pigment dispersions. These applications are more conventional whereby the formulations are less expensive to produce and the volumes of product produced are large. The Morehouse-COWLES product lines are used in broader, high volume, lower value-added applications requiring less stringent particle size reduction.

The Morehouse-COWLES equipment is used independent of the Microfluidizer® processor equipment in the preparation of many industrial fluid formulations where the desired product characteristics do not require the sub-micron size of particles created by Microfluidizer® processing.

The Company currently manufactures and markets the following lines of equipment:

Epworth Mill Division:

Prior to October 1, 2000, the Company s Epworth Mill Division products consisted of ball mills and horizontal media mills. The division was also engaged in the sale and distribution of grinding media. Ball mills are used in coarse grinding application of liquid slurries such as ore from mines or coarse slurries of material that will later be processed into finer slurries. Ball mills use large media in a horizontal rotating cylindrical vessel to crush and grind the product being processed. The patented Zinger® horizontal media mill utilizes a unique design for grinding and dispersing solid materials in a liquid carrying medium. The design is based upon established rotating, horizontal shaft technology but adds the unique capability of enhanced mechanical activity between the grinding media and the product formulation. The enhanced mechanical activity is achieved through a unique combination of specially designed rotors and containment vessels. In comparison to traditional horizontal media mills, the Zinger media mill technology has demonstrated significantly improved productivity in terms of greater volumes of product processed at acceptable quality than the comparably sized and priced horizontal media mills. On July 24, 2000, the Company announced that it would transfer the manufacturing and sale of its Zinger® horizontal media mills from its Michigan-based Epworth Mill Division to the Morehouse-COWLES Division plant in Fullerton, California. The transfer began on October 1, 2000, and was completed in the fourth quarter of fiscal 2000.

On September 30, 2000, the Company ceased operations of the Ball Mill repair business and decided to sell its Ball Mill operation conducted at the Epworth Mill Division through a broker. On April 13, 2001 the Company concluded the sale of the assets of the division s operation for $200,000 in cash and a promissory note, which resulted in a loss on the sale of these assets of approximately $53,000.

Marketing and Sales:

The Company s marketing and sales activities are conducted through a corporate marketing and sales group that is responsible for the worldwide marketing and sales of all products.

Marketing programs include media advertising, a website, direct mail, seminars, trade shows and telemarketing. In addition, the Company has an active program of field demonstrations, as well as demonstrations to potential users in the Company s laboratories located in Newton, Massachusetts, Fullerton, California, and Lampertheim, Germany. Distributors and sales agents worldwide are supported with trade advertising, collateral literature and trade show materials. The distributors and sales agents also advertise directly on their own behalf and attend regional and international trade shows. As an aid to the marketing and sales activity for the equipment, the Company provides prospective customers with access to its applications laboratories. These laboratories provide free processing and particle size and distribution analysis of a prospective customer s sample formulation. Additionally, a prospective customer may pay for subsequent laboratory time and services on a fee for services basis, which includes equipment rentals.

The Company sells its equipment in the United States through a network of independent manufacturer s representative firms who are managed by the Company s regional sales managers. In Canada, the Company has an exclusive distributor for the Company s product line. In Europe, the Company sells its equipment through a network of independent regional sales agents and distributors who are managed by the Company s European Sales organization. In Asia and the Pacific Rim, the Company sells through a network of distributors and independent manufacturer s representative firms. Customers in other geographical regions are assisted directly by Company sales staff.

Customers:

The users of the Company s systems are in various industries, including the chemical, pharmaceuticals, food, cosmetic and biotechnology industries. Two customers accounted for 21% and 11%, respectively, of the revenues from continuing operations in 2003. Two customers accounted for

18% and 16% of the revenues from continuing operations in 2002, respectively. Two customers accounted for 17% and 10% of the trade accounts receivable from continuing operations as of December 31, 2003, respectively, and one customer accounted for 13% of the trade accounts receivable as of December 31, 2002. A reduction or delay in orders from these or other significant customers could have a material adverse effect on the Company s results of operations. No customer accounted for more than 10% of the Company s revenues in 2001.

Competition:

The patented Microfluidizer® equipment product line of high shear fluid processors has direct competition in its major markets, including pharmaceutical and coatings/chemical applications, but management believes that the Company s products have larger installed bases and competitive performance advantages over products of our competitors. The Company believes that the Microfluidizer® processor equipment product line offers the highest shear forces available in the process equipment market today. It has been proven in many instances that for critical formulations Microfluidizer® processors produce better quality products for our customers.

The M-700 Series of fluid processors, together with the M-210 and M-610 product lines, provide high shear fluid processing capabilities for sanitary, sterile, and industrial applications. The Company believes that the Microfluidizer® product line provides a distinct advantage over the product lines of our competitors with respect to the processing of abrasive slurries or solids dispersed in liquids in large part because of the Company s unique, wear-resistant, diamond interaction chamber and the special design of the intensifier pumping system.

The MMR systems may encounter significant competition and there are other companies that possess patents and claims to equipment or processes that claim to make production quantities of nanoparticles. At least one of these companies, Five Star Technologies Inc. (Five Star), has raised significant investment capital from venture capital sources ($4.5 million in its second round) for its patented technology. Five Star claims the use of hydrodynamic cavitation to achieve production or nano and micro materials. Five Star also claims that its process is inherently scalable. Although the Company believes that its MMR system is superior in design and function there can be no assurance that Five Star, or others, will not pose a competitive impediment to sales of the Company s MMR system.

The Company faces, and will continue to face, intense competition from other companies who manufacture and sell fluid processing systems. The Company is subject to significant competition from organizations that are pursuing technologies and products that are similar to the Company s technology and products. The Company s future success will depend in large part on its maintaining its current technologically superior product line and competitive position in the fluid processing systems field. Rapid technological development by the Company or others may result in the Company s products or technologies becoming obsolete before the Company recovers the expenses it incurs in connection with their development. Products offered by the Company could be made obsolete by less expensive or more effective technologies. There can be no assurance that the Company will be able to make the enhancements to its technology necessary to compete successfully with newly emerging technologies. The Company expects competition to intensify in the fluid processing systems field as technical advances are made and become more widely known.

Research and Development:

The Company s research and development efforts are focused on: (i) developing new processing applications for the process industries and further enhancing the functionality, reliability and performance of existing products, and (ii) development of the Multiple-Stream High Pressure Mixer/Reactor (MMR) by: (a) working with customers who assist in the development of the system with both application knowledge and financial support, and (b) internal development program relating to interaction chamber design and creation of a variety nanomaterials. There can be no assurance that the Company will be able to meet the enhancement challenges posed by applications of its core Microfluidizer® processor business. Likewise there can be no assurance that the Company will be able to design and manufacture chambers for its MMR applications that will deliver the desired result for specific applications. Research and development costs for continuing operations were $785,849, $583,683, and $537,428 in 2003, 2002, and 2001, respectively. Patent coverage for the MMR has been obtained both in the United States and in Europe (with national entry in process) and is prosecuting the patent application in Canada.

Cooperative Research Arrangements:

The Company subsidizes research and development activities centered around Microfluidizer® processor technology at a number of research centers and universities. The Company s subsidy of these activities takes the form of substantial reduction or elimination of the customary rental charges for the Microfluidizer® equipment provided for use. The Company has, in past years, subsidized research and development in the following fields at the following universities: The University of Massachusetts, Lowell biotechnology; Lehigh University polymer chemistry; Université Laval (Quebec) food science; Worcester Polytechnic Institute (WPI) catalytic chemistry; and Purdue University pharmaceuticals. In addition to their research activities, these universities provide the Company with contacts at industrial companies that may utilize the Microfluidizer® processing technology. Additionally, on occasion, research reports, technical papers, and doctoral theses may be published, which document the use of Microfluidizer® technology. Finally, the Company engages in many informal co-operative development efforts with its customers.

In addition to providing subsidies, the Company has, in the past, entered into a research arrangement with Worcester Polytechnic Institute (WPI). The Company commenced supported research and development at WPI in 1988 and continued such support until the mid 1990 s. In 1992, the Company entered into a cooperative venture with WPI to develop, patent and license for WPI, for its commercial applications, the Microfluidizer® process technology in the following fields: (i) the production of catalysts used in chemical and petroleum processing; (ii) the manufacture of advanced ceramic materials; and (iii) the destruction of volatile organic compounds and other organic contaminants in process waste water. The Company and WPI applied for United States and foreign patents in 1992 and 1993, respectively, which cite the Microfluidizer® processing technology as enabling the above process technologies. The two applied-for United States patents were both granted and issued to WPI in the United States in 1995. In 1996 one applied for patent was granted to WPI in France for European entry in the Patent Cooperation Treat (PCT) countries. The program is inactive at this time.

Patents and Proprietary Rights Protection:

To protect its proprietary rights, the Company relies on a combination of U.S. patent and trademark laws, trade secrets, confidentiality agreements, contractual provisions and technical means. In the event of patent infringement or breach of confidentiality, there can be no assurance that these measures will be adequate or that the Company will have sufficient resources to prosecute or prevail in an action against a third party. In addition, the Company has not sought patent or trademark protection for its Microfluidizer® equipment s interaction chamber in any country other than the United States and, as such, its proprietary rights are not subject to the protection of patent or trademark laws of foreign countries where the Company s equipment is sold. The Company s Microfluidizer® equipment process patent expires on March 13, 2007 and its device patent expired on August 6, 2002. The Company does not believe that the expiration of its patent will result in any material detriment to the Company since the Company has made many alterations, improvements and advances to its equipment over the years with such modification and innovations having been treated by the Company as trade secrets. In 1997 the Company completed development of a novel adaptation of its Microfluidizer® equipment a Multiple Stream High Pressure Mixer/ Reactor (MMR). In August 1997, the Company filed a patent application for the device and its processes with the United States Patent and Trademark Office (USPTO), and filed a Patent Cooperation Treaty (PCT) application on May 5, 1998. In July and November 2000, the USPTO issued to the Company notices of allowances of utility patent claims regarding the MMR and the use thereof. On September 18, 2002, the European Patent Office advised the Company it would grant its MMR patent substantially as applied for, including its device and process claims. The Company is in the process of pursuing national entry in France, Germany, Italy, The Netherlands, and the United Kingdom. The Company is prosecuting its MMR patent in Canada.

The Company maintains confidentiality agreements with its employees and also maintains confidentiality agreements and non-competition agreements with those third parties to whom it discloses non-public technical information relating to its equipment. The Company believes that enforcement of the provisions of such agreements should adequately protect the Company s proprietary information. However, in the event of a material breach of such agreements certain of the Company s valuable intellectual property may be disclosed to third parties (including competitors). In such event, despite provisions for equitable relief and damages in the event of such breaches the Company may suffer competitively and be materially impacted negatively as a result of such unauthorized disclosure.

Manufacturing:

At present, the Microfluidics Division subcontracts the manufacture and/or machining and finishing of many of the components of its equipment to third parties, with the Company undertaking the remaining fabrication, assembly and performance testing. The Microfluidics Division has selected certain primary suppliers based upon pricing terms, quality of their products, and the vendor s performance record. The Company believes that there are adequate available alternate manufacturing sources and suppliers for all of its components and raw materials requirements.

The loss of any primary supplier could have a material, adverse effect on the Company s business, financial condition, or results of operations. Therefore, the Company has identified alternative suppliers for its most critical components of its equipment (Alternative Sources). There can be no assurance that a transition to such Alternative Sources will not entail transitional delays, quality assurance and quality control difficulties, on time delivery problems, any or all of which would likely have an impact on the Company s production of equipment and may have a material adverse effect on the Company s business, financial condition, or results of operations.

Key Management / Personnel:

The Company s continued operation, innovation and growth are to some significant degree reliant on the continued services of its key executive officers and leading technical personnel. The Company does not maintain employment contracts with its key management or leading technical personnel. Though the Company believes that it can identify and recruit replacement key management and technical personnel, there can be no assurance as to such availability, the length of time required to obtain such replacement management and technical personnel, the salary level that may have to be paid to obtain their respective services, or the impact on operations that may be experienced through the interim absence of such key management and technical personnel. The loss of key management or leading technical personnel could, therefore, have a material adverse effect on the Company s business, financial condition, or results of operations.

Government Regulation:

Certain of the Company s customers utilize the Company s products in processes and production that are subject to governmental regulation. For example, the manufacturing and marketing of pharmaceutical products may require the approval of the Food and Drug Administration (FDA) within the United States and of comparable agencies in foreign countries. The FDA has established mandatory procedures, safety standards and protocols that apply to the manufacture, clinical testing and marketing of new pharmaceutical products in the United States. The process of seeking and obtaining FDA approval of a new product often takes a number of years and often involves the expenditure of substantial resources by the Company s customers. The FDA approval process can result in long lead times that are attendant to manufacturing equipment orders for these applications.

Further, in addition to product approvals, the FDA imposes requirements as to manufacturing practices, record keeping and reporting (Good Manufacturing Practices or GMP). GMP-regulated companies are subject to inspections by the FDA (inclusive of Microfluidizer® processor equipment) and product approvals may be withdrawn if GMP are not met.

At present, the Company s customers include companies who are making FDA approved drugs, preparations, and products (example: x-ray film) for external use and companies who utilize

Microfluidizer® processor equipment for the formulation or production of FDA approved parenteral (injectable) drugs or compounds.

For the Company s equipment entering Europe, CE compliance (Regulatory Compliance with European Safety Standards) is required. All products manufactured by the Microfluidics Division are CE compliant.

Various laws, regulations and recommendations relating to safe working conditions, laboratory practices and the purchase, storage, movement, import and export, use and disposal of harmful or potentially harmful substances that may be used in connection with the Company s research work are, or may, be applicable to its activities. These laws include, among others, the United States Atomic Energy Act, the Clean Air Act, the Clean Water Act, the Occupational Safety and Health Act, the National Environmental Policy Act, the Toxic Substances Control Act, the Resource Conservation and Recovery Act, national restrictions on technology transfer, import, export and customs regulations and other present and possible future local, state or Federal regulation. The extent of adverse governmental regulation, which might result from future legislation or administrative action, cannot be accurately predicted. Certain agreements that may be entered into by the Company involving exclusive license rights may also be subject to national or supranational antitrust regulatory control, the effect of which cannot be predicted.

To date the Company has not been effected by any United States governmental restrictions on technology transfer, import, export and customs regulations and other present local, state or Federal regulation. The extent of adverse governmental regulation, which might result from future legislation or administrative action, cannot be accurately predicted. In particular, H.R. 3162 enacted on October 21, 2001 (the Patriot Act) and other governmental regulation may impose export restrictions on sale of equipment or transfer of technology to certain countries or groups. There can be no assurance that sale of the Company s equipment will not be impacted by such legislation or designation. Depending upon which countries and sales may be designated for trade restriction such action could have a material adverse effect on the Company s business, financial condition, or results of operations. Also, certain agreements that may be entered into by the Company involving exclusive license rights may also be subject to national or supranational antitrust regulatory control, the effect of which cannot be predicted.

Backlog:

The Company s sales order backlog related to continuing operations of accepted and unfilled orders at March 24, 2004, and March 14, 2003 was approximately $2,226,000 and $3,146,000, respectively. Backlog as of any particular date should not be relied upon as indicative of the Company s net revenues for any future period.

Employees:

The Company has approximately 41 full-time employees as of March 24, 2004. None of the Company s employees are covered by a collective bargaining agreement, and the Company considers its relations with its employees to be satisfactory. The Company believes that its future success will depend in large part on its ability to attract and retain highly skilled employees.

Item 2. PROPERTIES

The Company s corporate headquarters are in Newton, Massachusetts. The Company also maintains a sales office and laboratory facility in Lampertheim, Germany and a sales office and applications laboratory in Fullerton, California. The Company rents approximately 48,200 square feet of offices, production and research and development facilities at these locations for administrative, development and production activities. A portion of the space at the Newton, MA facility is sublet to a non-affiliated company for a total of $12,000 per annum under a tenant at will arrangement. The lease terms expire at various times through August 2006. The Company has the option to extend the leases for up to five additional years. The Company believes these facilities will be adequate for operations for the next several years.

Item 3. LEGAL PROCEEDINGS

The Company is not a party to any material legal proceedings.

Item 4. SUBMISSION OF MATTERS TO VOTE OF SECURITY HOLDERS

No matters were submitted to a vote of the Company s security holders during the quarter ended December 31, 2003.

Item 5. MARKET FOR REGISTRANT S COMMON EQUITY AND RELATED STOCKHOLDER MATTERS

Market

The Company s Common Stock is traded on the Over-the-Counter Bulletin Board under the symbol MFIC. The following table sets forth the range of quarterly high and low bid quotations for the last two fiscal years, as furnished by the National Association of Securities Dealers Automated Quotation System. The quotations represent interdealer quotations without adjustment for retail markups, markdowns, or commissions, and may not necessarily represent actual transactions.

Quarters Ended	12/31 2003	9/30 2003	6/30 2003	3/31 2003	12/31 2002	9/30 2002	6/30 2002	3/31 2002
Low	$ 0.85	$ 0.57	$ 0.20	$ 0.23	$ 0.25	$ 0.28	$ 0.35	$ 0.41
High	$ 2.70	$ 1.90	$ 0.73	$ 0.47	$ 0.43	$ 0.42	$ 0.45	$ 0.55

Holders

As of March 24, 2004, there were approximately 470 holders of record of the Company s Common Stock.

Dividends

The Company has never paid any cash dividends on its Common Stock and presently anticipates that no dividends on its Common Stock will be declared in the foreseeable future. The Company s current policy is to retain all of its earnings to finance future growth. In addition, pursuant to loan covenants contained in the Company s loan agreement with its commercial lender, the Company may not pay dividends without the commercial lender s prior approval.

Equity Compensation Plan Information:

The information in the table below is as of December 31, 2003. See also the Consolidated Financial Statements Note 10.

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants and rights (a)	Weighted-average exercise price of outstanding options, warrants and rights (b)	Number ofsecurities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders	1,929,662	$ 0.74	1,206,898
Equity compensation plans not approved by security holders			
Total	1,929,662	$ 0.74	1,206,898

Item 6. SELECTED FINANCIAL DATA

The selected financial information presented below is derived from the audited consolidated financial statements of the Company for each of the five year period ended December 31, 2003. The information set forth below should be read in conjunction with Management s Discussion and Analysis of Financial Condition and Results of Operations and the Consolidated Financial Statements and related Notes included elsewhere in this Form 10-K. All fiscal years noted below have been restated to reflect the discontinued operations of MFIC Corporation.

Selected Statement of Operations Data

	Year Ended December 31, 2003	Year Ended December 31, 2002	Year Ended December 31, 2001	Year Ended December 31, 2000	Year Ended December 31, 1999
Total revenues	$ 10,459,631	$ 9,514,180	$ 11,210,375	$ 10,034,585	$ 8,675,871
Total costs and expenses	9,693,551	8,872,465	10,934,902	10,449,756	9,284,229
Income (loss) from continuing operations	766,080	641,715	275,473	(415,171)	(608,358)
Interest expense	(116,097)	(179,429)	(261,754)	(350,486)	(542,045)
Other expense			(53,142)	(250,000)	
Interest income	9,508	7,191	7,032	248	9,835
Gain on sale of investments					11,864
Net income (loss) from continuing operations before extraordinary item	659,491	469,477	(32,391)	(1,015,409)	(1,128,704)
Gain on subordinated debt restructuring				194,500	
Net income (loss) from continuing operations	659,491	469,477	(32,391)	(820,909)	(1,128,704)
(Loss) income from discontinued operations (Net of loss from disposal of discontinued operations of $1,422,715)	(4,109,925)	(2,983,451)	(492,795)	347,801	274,270
Net loss	(3,450,434)	(2,513,974)	(525,186)	(473,108)	(854,434)
Weighted-average shares outstanding:					
Basic	7,767,712	7,426,586	7,375,102	7,086,058	5,818,588
Diluted	8,501,110	7,470,090	7,375,102	7,086,058	5,818,588
Basic amounts per common share:					
Net income (loss) per share from continuing operations before extraordinary gain	$ .08	$ .06	$ (.00)	$ (.14)	$ (.19)
Extraordinary gain per share:				$ .03	
Net income (loss) per share from continuing operations	$ .08	$ .06	$ (.00)	$ (.11)	$ (.19)
Basic net (loss) income per share from discontinued operations	$ (.52)	$ (.40)	$ (.07)	$ .05	$ .04
Basic, as reported	$ (.44)	$ (.34)	$ (.07)	$ (.06)	$ (.15)
Diluted amounts per common share:					
Net income (loss) per share from continuing operations before extraordinary gain	$ .08	$ .06	$ (.00)	$ (.14)	$ (.19)
Extraordinary gain per share:				$ .03	
Diluted net income (loss) per share from continuing operations	$ .08	$ .06	$ (.00)	$ (.11)	$ (.19)
Diluted net (loss) income per share from discontinued operations	$ (.52)	$ (.40)	$ (.07)	$ .05	$ .04
Diluted, as reported	$ (.44)	$ (.34)	$ (.07)	$ (.06)	$ (.15)

Item 7. MANAGEMENT S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

CERTAIN FACTORS AND CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

Management believes that this report contains forward-looking statements that are subject to certain risks and uncertainties including statements relating to the Company s plan to achieve, maintain and/or increase revenue growth and/or operating profitability, and to attain net operating profitability. Such statements are based on management s current expectations and are subject to a number of factors and uncertainties that could cause actual results achieved by the Company to differ materially from those described in the forward-looking statements. The Company cautions investors that there can be no assurance that the actual results or business conditions will not differ materially from those projected or suggested in such forward-looking statements as a result of various factors, including but not limited to, the following risks and uncertainties: (i) whether the performance advantages of the Company s Microfluidizer® materials processing equipment will be realized commercially or that a commercial market for the equipment will continue to develop, (ii) whether the Company will have access to sufficient working capital through continued and improving cash flow from sales and ongoing borrowing availability, the latter being subject to the Company s ability to comply with the covenants and terms of the Company s loan agreement with its senior lender, (iii) whether the Company s expectation that the benefits of nanotechnology will, in part, be realized by the ability of the MMR to produce innovative materials in large quantities, and (iv) whether the Company s is able to increase the number of prototype MMR placements and then manufacture and introduce commercial production MMR equipment.

Critical Accounting Policies

The Company considers certain accounting policies related to revenue recognition and related receivables as well as the valuation of inventories to be critical policies due to the estimation processes involved in each.

Revenue Recognition **The Company s policy is to recognize revenue from sales of machines and spare parts upon shipment to our customers and the fulfillment of all contractual terms and conditions, pursuant to the guidance provided by Staff Accounting Bulletin No. 101, Revenue Recognition in Financial Statements (SAB 101), issued by the Securities and Exchange Commission.**

Rental income from the lease of equipment is recognized on a straight-line basis over the term of the lease agreement.

Judgments are required in evaluating the creditworthiness of our customers. In all instances, revenue is not recognized until the Company has determined that collection is reasonably assured.

Should changes in conditions cause management to determine the aforementioned criteria are not met for certain future transactions, revenue recognized for any reporting period could be adversely affected.

Allowance for Doubtful Accounts **The Company s policy is to maintain allowances for estimated losses resulting from the inability of our customers to make scheduled payments. The Company regularly evaluates the collectibility of our trade receivable balances based on a combination of factors. When a customer s account balance becomes past due, we initiate dialogue with the customer to determine the cause. If it is determined that**

the customer will be unable to meet its financial obligation to us. The Company records a specific allowance to reduce the related receivable to the amount we expect to recover given all information presently available.

The Company believes our reported allowances are adequate as of December 31, 2003 and 2002. If the financial condition of our customers were to deteriorate, however, resulting in their inability to make payments, the Company may need to record additional allowances, which would result in additional expenses being recorded for the period in which such determination was made.

Inventory Valuation **The Company values its inventory at the lower of cost or net realizable value on a first-in-first-out method. Management regularly evaluates inventory quantities on hand and records a provision for obsolete or excess inventory levels greater than those of anticipated usage in the subsequent two years. There are external factors that may require an adjustment to the anticipated demand including, but not limited to, technological changes in our markets, our ability to meet changing customer requirements, competitive pressures in products and prices, and the availability of key components from our suppliers. Purchasing requirements and alternative usage avenues are explored within these processes to mitigate inventory exposure. When recorded, our Company s reserves are intended to reduce the carrying value of our inventory to its net realizable value.**

Impairment **It has been the Company s policy to review the carrying values of long-lived assets and amortizable intangibles for impairment whenever an event or changes in circumstances indicated that the carrying amount of an asset may not be recoverable.**

Product Warranties **The Company s products are generally sold with a twelve month warranty provision that require us to remedy deficiencies in quality or performance of our products at no cost to our customers only after it has been determined that the cause of the deficiency is not due to the actions of the machine operator or product used in the machine.**

Fiscal 2003 Compared to Fiscal 2002

In 1998, the Company purchased the assets and liabilities of Morehouse-COWLES Inc. (Morehouse-COWLES). This was done to complete a strategic combination with the Microfluidics Division, in order to enhance the Company s position in the coatings market, which, at the time, was the dominant part of the Company s business.

Since that time, the direction of the core business of the Company changed significantly from coatings to other areas, (in particular the Health Care sector). The Company determined that it could no longer support the previous strategic plan and the Company, therefore, prepared a plan to divest the Morehouse-COWLES Division.

It was expected that the sale would positively impact the Company s cash flow, and would allow the Company to focus on the core business, and expand its sales and marketing resources for the Company s Microfluidizer® process systems line, and promote its new MMR nanoparticle production systems.

During the fourth quarter of 2003, management committed to a plan to sell substantially all the assets and associated liabilities of Morehouse-COWLES. Accordingly, at year end, the Company reported the division as discontinued operations and reclassified the assets and associated liabilities as available for sale. The search for a buyer eventually resulted in NuSil Corporation, a California corporation (NuSil) making an offer in December 2003 to purchase the Morehouse-COWLES Division s assets and related liabilities at a price that was acceptable to the Company.

On February 9, 2004, pursuant to an Asset Purchase Agreement (the Asset Purchase Agreement) dated February 5, 2004 between MFIC Corporation (MFIC) and a wholly owned subsidiary of NuSil, MFIC sold substantially all of the assets and selected liabilities of its Morehouse-COWLES Division (the Division), to NuSil. Other than NuSil s prior purchases of products from the Division, there were no preexisting relationships between MFIC and NuSil.