NVE CORP /NEW/
Form 10KSB
May 27, 2004

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-KSB

(Mark One)

ý **ANNUAL REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended March 31, 2004

o **TRANSITION REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission file number 000-12196

NVE Corporation

(Name of small business issuer in its charter)

Minnesota	**41-1424202**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
11409 Valley View Road, Eden Prairie, Minnesota	**55344**
(Address of principal executive offices)	(Zip code)

Issuer s telephone number **(952) 829-9217**

Securities registered under Section 12(b) of the Exchange Act: **None**

Securities registered under Section 12(g) of the Exchange Act: **Common stock, $0.01 par value (Common Stock)**

Check whether the issuer: (1) filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the past 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

Check here if there is no disclosure of delinquent filers in response to Item 405 of Regulation S-B is not contained in this form, and no disclosure will 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-KSB or any amendment to this Form 10-KSB. o

State issuer s revenues for the most recent fiscal year: **$12,010,851**

The aggregate market value of the voting stock (Common Stock) held by non-affiliates of the Registrant, as of May 14, 2004, was approximately $108 million based on the last sale price reported for such date on The NASDAQ SmallCap Market.

The number of shares of the Registrant s Common Stock (par value $0.01) outstanding as of May 14, 2004 was 4,494,245.

DOCUMENTS INCORPORATED BY REFERENCE

Parts of our Proxy Statement for our 2004 Annual Meeting of Stockholders are incorporated by reference into Items 10, 11, 12 and 13 hereof.

Transitional Small Business Disclosure Format (Check one): Yes o; No ý

NVE CORPORATION

FORM 10-KSB

FOR THE FISCAL YEAR ENDED MARCH 31, 2004

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GLOSSARY OF KEY TERMS

Coupler	A device which transmits data between electronic systems. NVE makes spintronic couplers that transmit information much faster than the fastest optical couplers. Couplers are also known as isolators because they electrically isolate the coupled systems.
DRAM (Dynamic Random Access Memory)	The largest-capacity and most common type of conventional memory. MRAM has the potential to match DRAM bit density but would be faster and nonvolatile.
Electron Spin	Electrons have two stable spins (up and down). Electron spin causes magnetism on the atomic level; spintronics encodes data in electron spin.
Embedded Memory	Memory combined with other electronics on the same integrated circuit, such as a cellphone on a chip. It is virtually impossible to embed the various types of conventional memory required for a total system together on one IC; however, MRAM replaces all the different memory types (DRAM, SRAM, Flash), and can be embedded.
Free Layer	A layer in SDT or GMR structures where the spin polarization of electrons can be switched, usually by magnetic energy. This is the layer where data is sensed or stored.
Flash Memory	The leading conventional nonvolatile memory. Used in cellphones for permanent storage. Versions are used in memory cards and sticks, but these are much too slow for program execution. MRAM has the potential to meet and exceed Flash bit density but with unlimited life and much higher speed.
Giant Magnetoresistor (GMR)	A spintronic device that produces a large change in resistance of a conducting layer. Giant refers to its very large electrical signal. GMR is at the heart of NVE s sensors and couplers, and can also be used for a basic type of MRAM.
IsoLoop®	NVE s spintronic coupler brand name. Refers to a microscopic coil combined with GMR elements. The coil creates a small magnetic field that is picked up by the GMR elements transmitting data almost instantly.
MRAM (Magnetic Random Access Memory)	A revolutionary memory fabricated using nanotechnology which uses electron spin to encode data. MRAM has been called the holy grail of memory because it has the potential to combine the speed of SRAM, the density of DRAM, and the nonvolatility of flash.
Magneto-Thermal MRAM	An MRAM design that uses a combination of magnetic fields and ultra-fast heating from electrical current pulses to increase density and reduce the energy required to write data. NVE has patents and research programs in this area, which has the potential to increase MRAM bit densities.
Nonvolatile	A memory that retains its data even when the power is removed. MRAM is inherently nonvolatile.
Optical Coupler (also Opto-Coupler)	A conventional coupler which uses the combination of a light-emitting diode and photo detector to transmit information. NVE couplers are faster and denser than optical couplers, and unlike optical couplers which where out, spintronic couplers last indefinitely.
SRAM (Static Random Access Memory)	A conventional memory that is faster than DRAM but lower density. Used for high-speed operations such as digital signal processing in cellphones and caches in computers. MRAM has the potential to match the speed of SRAM but with nonvolatility and much higher bit density.
Sensor	A device which acquires information such as position or speed. NVE makes ultra-precise spintronic sensors which report data such as the position of a robot arm.
Spin-Dependent Tunnel (SDT) Junction	A spintronic nanotechnology device that produces a large change in resistance through a normally insulating layer, depending on the predominant spin in a free layer. This allows electron spin to be sensed as electrical resistance for interface to conventional electronics. SDT devices use a layer as thin as a few

	atoms. SDT devices are at the heart of MRAM and low-field sensors. Also known as Magnetic Tunnel Junctions (MTJs) or Tunneling Magnetic Junctions (TMJs).
Spin Valve	A spintronic switch with two stable resistance states. Spin valves are used in many of NVE s products.
Spintronics	A nanotechnology which utilizes electron spin rather than electron charge to acquire, store and transmit information.
Tunneling Magnetoresistance (TMR)	The change in resistance between two stable states of a spin-dependent tunnel junction at room temperature. NVE scientists recently demonstrated a record Spin Dependent Tunnel junction, which could make MRAM faster and more cost effective
Wafer	Thin (less than 1 millimeter thick), circular material, most often silicon, used to manufacture semiconductors and other devices. Often contains thousands of devices.

PART I

FORWARD-LOOKING STATEMENTS

Some of the statements made in this Report and the documents incorporated by reference in this Report under Item 1 Description of Business and Item 6 Management s Discussion and Analysis or Plan of Operation constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. These statements are subject to the safe harbor provisions of the reform act. Forward-looking statements may be identified by the use of the terminology such as may, will, expect, anticipate, intend, believe, estimate, should, or continue or the negatives of these terms or other variations on these words or comparable terminology. To the extent that this Report contains forward-looking statements regarding the financial condition, operating results, business prospects or any other aspect of NVE, you should be aware that our actual financial condition, operating results and business performance may differ materially from that projected or estimated by us in the forward-looking statements. We have attempted to identify, in context, some of the factors that we currently believe may cause actual future experience and results to differ from their current expectations. These differences may be caused by a variety of factors, including but not limited to adverse economic conditions, intense competition, including entry of new competitors, our ability to obtain sufficient financing to support our operations, progress in research and development activities by us and others, variations in costs that are beyond our control, adverse federal, state and local government regulations, unexpected costs, lower sales and net income, or higher net losses than forecasted, price increases for equipment, our dependence on significant suppliers, including Taiwan Semiconductor Manufacturing Corporation for foundry semiconductor wafers, our ability to meet stringent customer technical requirements, our ability to consummate additional license agreements, our ability to continue eligibility for SBIR awards, our inability to raise prices, failure to obtain new customers, the possible fluctuation and volatility of our operating results and financial condition, inability to carry out marketing and sales plans, loss of key executives, and other specific risks that may be alluded to in this Report.

ITEM 1. DESCRIPTION OF BUSINESS.

In General

NVE Corporation develops and sells devices using spintronics, a nanotechnology we helped pioneer, which utilizes electron spin rather than electron charge to acquire, store and transmit information. We are a licensor of spintronic magnetic random access memory technology, commonly referred to as MRAM, which we believe has the potential to revolutionize electronic memory. We also manufacture high-performance spintronic products including sensors and couplers which are used to acquire and transmit data in automated factories.

NVE History and Background

We were founded in 1989 primarily as a government contract research company. We have licensed our MRAM intellectual property to others, including Cypress Semiconductor Corporation, Honeywell International, and Motorola, Inc. We also manufacture spintronic sensor and couplers which are sold through a worldwide network of manufacturers representatives and distributors. We also have an agreement with Agilent Technologies, Inc. to distribute our couplers under their brand. Our commercial product revenues have been growing rapidly in the past two fiscal years.

In November 2000, our shareholders approved our merger with and into Premis Corporation, a publicly-traded and reporting corporation, with Premis surviving under the new name NVE Corporation. We executed a one-for-five reverse split of our common stock to shareholders of record at the close of business on November 21, 2002, and on January 22, 2003 our common stock began trading on the NASDAQ SmallCap Market.

Our Enabling Technology

Our designs use one of two nano-scale spintronic structures: giant magnetoresistors or spin-dependent tunnel junctions. Both structures produce a large change in electrical resistance depending on the electron spin orientation in a free layer.

In giant magnetoresistance (GMR) devices, the resistance changes due to conduction electrons scattering at interfaces within the devices. The GMR effect is only significant if the layer thicknesses are less than the mean free path of conduction electrons, which is approximately five nanometers. Our critical GMR conductor layers are less than two nanometers thick.

The second type of spintronic structures we use is called spin-dependent tunnel junctions, also known as SDT junctions, Magnetic Tunnel Junctions (MTJs), or Tunneling Magnetic Junctions (TMJs). SDT junctions use tunnel barriers which must be so thin that electrons can tunnel through a normally insulating material to cause a resistance change. The SDT barrier thicknesses are in the range of one to two nanometers or approximately five molecules. Technological advances in recent years have made it practical to manufacture such small dimensions.

Both SDT junctions and GMR provide sensitivity that was previously possible only with super-cooling. In our products the spintronic elements are connected to integrated circuitry and packaged in much the same way as conventional integrated circuits.

Industry Background

Much of the electronics industry is devoted to the acquisition, storage and transmission of information. Global trends such as richer data, more video, and remote data collection test the speed and capacity of conventional electronics.

The 1970s brought microelectronic devices including Hall effect sensors for data acquisition, semiconductor random access memory (commonly referred to as RAM) for data storage, and light-emitting diode-based opto-couplers for data transmission. There have been incremental improvements to these devices over the years, but the basic limitations of charge-based electronics remain.

We believe spintronics represents the first major change in microelectronic technology since the advent of these devices a generation ago. We believe memories, sensors, and couplers together represent a significant portion of the electronics industry, which can be addressed by spintronics.

Memories are a critical part of almost every electronic device. For some electronic device functions speed is required; others require a large amount of memory; and some require nonvolatility. No one semiconductor memory meets all three of these requirements. For example, a cellphone requires the bit density of DRAM for the operating software, the speed of SRAM for digital signal processing, and the nonvolatility of flash memory for phone books and other permanent storage. The three memories consume power and space. Because they use incompatible materials, the three memories are very difficult to combine with each other or with other cellphone circuitry in a single integrated circuit.

Potential near-term MRAM applications include mission-critical storage such as military and industrial applications. As its density increases and cost per bit decreases, MRAM could replace semiconductor memories in cellphones, computers, and other electronic devices enabling smaller, faster, and more power-efficient electronics.

Sensors are used to detect the position or speed of robotics and mechanisms in a number of applications. As factories and industrial controls become more automated, there is a need for more precise position sensing. We believe our spintronic sensors acquire information such as the position of a robot arm or the speed of a motor, faster and more accurately than existing devices. We believe this allows higher quality, lower-cost production of products such as automobiles.

Like sensors, couplers are also widely used in factory automation. Couplers provide reliable digital communication between the various electronic subsystems in factories. For example, couplers are used to send data between robots and central controllers at very high speed. As manufacturing complexity increases, there is a need for higher speed data and more data channels. Because of their unique properties, we believe our couplers transmit more data at higher speeds and over longer distances than conventional devices.

Our Strategy

Our goal is to become the leading developer of practical spintronics technology and devices. We plan to do that through entering into new MRAM manufacturing partnerships, pursuing additional MRAM license agreements, expanding commercial product sales, and building intellectual property.

Monetize MRAM Intellectual Property Through Manufacturing Partnerships

Because of the large capital investment required to make large-scale memories, our strategy is to use manufacturing partnerships to monetize our MRAM intellectual property.

We expect to receive royalties, subject to certain terms and conditions, after Motorola goes into production, which is currently expected to occur in late 2004. Motorola has announced plans for stand-alone MRAM, as well as systems on chips for cellphones and other applications, which could contain embedded MRAM.

Rather than royalties, our agreement with Cypress gives us rights to their production designs and intellectual property, as well as rights to use Cypress factories to manufacture MRAMs for us. We plan to sell th