SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-K

[X] Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934
For the fiscal year ended March 31, 1999.

[ ] Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 [No Fee Required]
For the transition period from _____________ to _____________.

COMMISSION FILE NUMBER 0-16106

APA OPTICS, INC.
(EXACT NAME OF REGISTRANT AS SPECIFIED IN ITS CHARTER)

MINNESOTA	41-1347235
(STATE OR OTHER JURISDICTION OF INCORPORATION OR ORGANIZATION)	(I.R.S. EMPLOYER IDENTIFICATION NO.)

2950 N.E. 84TH LANE
BLAINE, MINNESOTA 55449
(612) 784-4995
(ADDRESS, INCLUDING ZIP CODE, AND TELEPHONE NUMBER, INCLUDING AREA CODE, OF REGISTRANT'S PRINCIPAL EXECUTIVE OFFICE)

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

Securities registered pursuant to Section 12(g) of the Act:

COMMON STOCK, PAR VALUE $.01 PER SHARE
(TITLE OF CLASS)

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the preceding 12 months and (2) has been subject to the filing requirements for the past 90 days. [X] YES [ ] NO

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. [ ]

The aggregate market value of the voting stock held by non-affiliates of the registrant as of May 18, 1999, was approximately $33,040,581.

The number of shares of Common Stock outstanding as of May 18, 1999 was 8,512,274.

DOCUMENTS INCORPORATED BY REFERENCE:

Portions of the proxy statement for the annual shareholders meeting to be held on August 18, 1999 ("Proxy Statement") are incorporated by reference into Part III.

PART I

ITEM 1. BUSINESS.

(a) GENERAL DEVELOPMENT OF BUSINESS.

From its founding in 1979, the Company has focused on leading edge research in sophisticated optoelectronic and optical system areas with the primary goal of developing advanced products for subsequent marketing and fabrication. APA Optics, Inc. currently manufactures DWDM optical components, offers a range of Nitride-based devices and services, and markets custom optics products.

For the last several years the Company's goal has been to manufacture and market products/components based on its technology developments. The Company selected two product areas: dense wavelength division multiplexer (DWDM) components for fiber optic communications and gallium nitride-based ultraviolet (UV) detectors (both components and integrated detector/electronic/display packages). These areas were selected due to significant potential markets and the Company's expertise and/or patent positions. If the Company is successful in manufacturing and marketing of these products, the Company expects to significantly increase its revenues and achieve profitability.

In order to perform product development and production, the Company needs to fully utilize its personnel and facilities. The Company could only accomplish this by reducing its emphasis on R&D contracts, realizing that this shift will significantly reduce revenues and increase losses until the Company realizes revenues from its products. Although the Company has purchased a significant amount of equipment in previous fiscal years, it will still need additional equipment as well as additional personnel to meet its objectives.

(b) DESCRIPTION OF BUSINESS.

PRODUCTS AND SERVICES

(i) Optical Lens Systems. The Company designs and builds multi-element lens systems and components, including mounting structures, for precision quality optical needs in many applications, including laser-based systems, imaging systems, inspection systems, display systems, display optics, focusing optics for ultraviolet fire alarms, alignment verification optics for dual magnetic recording heads, and multi-magnification optics systems for optical comparators.

(ii) Optical Thin Film Coatings. The Company custom designs, develops, and fabricates optical thin film coatings for optical components of lasers, laser systems, optical instruments, and optical devices. The Company uses its optical thin film coating services in two major ways. Antireflective coatings are deposited onto Company-fabricated lens components. The Company also uses its thin film coating facility to design, develop and fabricate coating for lens components supplied by customers.

(iii) Optoelectronics Devices. The Company is focusing its research and development efforts on several optoelectronic devices. Optoelectronic devices are vital components of communication systems and optical instruments.

Currently, the Company is developing the following devices:

Dense Wavelength Division Multiplexer (DWDM). Recently, the Company demonstrated the feasibility of a DWDM capable of transmitting several channels through a single optical fiber for communication applications. APA Optics developed the DWDM based on its development of optical modulator (single channel) technology during the early 1990s for fiber optic communication. These modulators have the capability of direct high speed (several billion bits per second) data loading and unloading on laser beams going through optical fibers, either for short distance or long distance. The DWDM, a small part of the modulator, utilizes high frequency halographic gratings. The DWDM developed recently provides a major break-through in that information can travel on several different channels within a single fiber (a simple analogy is the expansion of a single lane highway to multi-lane throughway). As a result, the DWDM provides higher speed, increased and regulated data handling

capabilities as compared to a single channel modulator. The Company is currently performing environmental packaging of the DWDM.

The Company filed the first patent related to the DWDM Optical Modulator in June 1994, which was allowed on May 8, 1995. Since then, the Company has filed for four additional patents related to DWD Multiplexer/Demultiplexer devices. The Company was awarded two of these patents in March 1997 and February 1998. The other two applications are still pending.

UV Detector. The UV Detector is a high response solid state detector based on single-crystal gallium nitride (GaN). The GaN detector is expected to have applications in spectrometry, solar radiation measurement, excimer-laser measurement and calibration, biomedical instrumentation, and flame detection and monitoring. The detector is visible blind, which allows detection of UV radiation in the presence of room lights without a filter. The Company believes the GaN detector has advantages over photomultiplier tubes because of its ruggedness and chemical inertness, which suit it for application in high-vibration and harsh environments as well as high-temperature operation. The Company has been awarded at least four patents in Nitride related technologies.

Other Products

The Company is in the process of introducing several other products by packaging its UV detectors with electronics and displays for many applications. Among these are a solar sensing watch to detect potential cancer causing UV radiation for consumer applications, UV radiation based flame sensors for industrial applications, and UV radiation meters for laboratory and industrial applications. All of these products have significant similarities and, therefore, do not require significant financial resources for development.

MARKETING AND DISTRIBUTION

The Company has delivered a limited number of alpha units of DWDM to customers during fiscal 1999 and 2000. The Company has sold several UV detectors to more than 30 customers as well as a few detector/electronics packages. During this time, the Company has been aggressively marketing both products by advertising in relevant professional magazines, showcasing its products in trade shows, direct mailing, personal visits, distributors in various countries, such as Japan, Germany, Italy and France. The Company also maintains product information on its Web Page. The Company has a sales manager who focuses on sales of DWDM and two persons who work on marketing and sales of Nitride-based products.

SOURCES OF RAW MATERIALS

Two principal materials used by the Company in its business are optical glass and optical chips. Optical glass is commercially available through several distributors. The Company currently uses at least two vendors for optical chips and continuously looks for additional vendors for these parts. Certain chemicals and other materials used by the Company are routinely available from several sources.

ENVIRONMENTAL COMPLIANCE

Because the Company handles a number of chemicals in its operations, it must comply with federal, state and local laws and regulations regarding the handling and disposal of such chemicals. The cost of such compliance is not material.

MAJOR CUSTOMERS

In prior years, the Company provided research and development services under contracts with various governmental agencies. Currently, the Company has no material contracts with any of such agencies.

In its efforts to promote sales of new products, the Company has begun to develop relationships with several potential new customers.

Revenues from the following unrelated customers constituted more than ten percent of the Company's total operating revenues in the last three fiscal years:

<TABLE>
<CAPTION>

	Year Ended March 31		
Name	1999	1998	1997
Government Agencies*	67%	89%	93%

</TABLE>

*REPRESENTS SERVICES TO SEVERAL OPERATING AGENCIES OF THE U.S. GOVERNMENT, AS FOLLOWS:

<TABLE>
<CAPTION>

	1999	1998	1997
Air Force	23%	20%	42%
Army	0	25	22
Navy	19	38	36
ARPA	58	17	--
Total	100%	100%	100%

</TABLE>

BACKLOG

The Company's backlog of uncompleted contracts at March 31, 1999, was approximately $189,000, as compared to $1,300,000 at March 31, 1998, and $3,200,000 at March 31, 1997. Of the current year's backlog, all contracts will be completed within the next year. The reduced backlog is a direct result of the Company's shift from contract R&D to product development and promotion.

COMPETITION

Competition in the optoelectronics and optics fabrication businesses is significant. Many of the companies engaged in these businesses are well-financed and have significantly greater research, development, production, and marketing resources than those of the Company. The Company believes that it has a competitive advantage due to its patents and the uniqueness of the device characteristics. In particular, the Company believes its DWDM is the most efficient (lowest insertion loss) and compact device currently available.

RESEARCH AND DEVELOPMENT

During the fiscal years ended March 31, 1999, 1998, and 1997 the Company spent approximately $382,000, $339,000, and $375,000, respectively, on research and development sponsored by the Company, all of which was related to the DWDM, UV detector and related products. In addition, in each of those years, the Company spent approximately $837,000, $1,431,000, and $1,610,000, respectively, on research activities sponsored by customers.

EMPLOYEES

As of March 31, 1999, the Company employed 36 full-time employees (including its executive officers).

ITEM 2. PROPERTIES.

The Company's corporate offices, manufacturing facilities, and laboratories are located in an industrial building at 2950 N.E. 84th Lane, Blaine, Minnesota. The Company currently leases 23,500 square feet of space in the building under sublease from Jain-Olsen Properties, a partnership consisting of Anil K. Jain and Kenneth A. Olsen, officers and directors of the Company. See Note 9 of Notes to Financial Statements included under Item 8 hereof. The Company owns land directly west of the Blaine facility that may be used for future expansion.

The Company also has a 24,000 square foot production facility in Aberdeen, South Dakota, which is used for manufacturing the Company's DWDM components and UV detectors. The land upon which this facility is located was granted to the Company as part of a financing package from the City of Aberdeen. See Note 5 of Notes to Financial

Statements included under Item 8 hereof for further information regarding the financing of this facility.

The Company believes that these two facilities will be adequate for its needs for the foreseeable future.

ITEM 3. LEGAL PROCEEDINGS.

The Company is not currently subject to any material legal proceedings.

ITEM 4. SUBMISSION OF MATTERS TO A VOTE OF SECURITY-HOLDERS.

No matter was submitted to a vote of security holders during the fourth quarter of the fiscal year covered by this report.

PART II

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

The Company's Common Stock is traded on The Nasdaq Small Cap Market. The following table sets forth the quarterly high and low prices for the Company's Common Stock for each quarter of the past two fiscal years as reported by Nasdaq.

FISCAL 1999	HIGH	LOW
Quarter ended June 30, 1998	$6-3/4	$5-5/8
Quarter ended September 30, 1998	6	4-1/4
Quarter ended December 31, 1998	5	4
Quarter ended March 31, 1999	10	4-3/4
FISCAL 1998		
Quarter ended June 30, 1997	$6-1/2	$5-1/4
Quarter ended September 30, 1997	6-5/8	5-3/8
Quarter ended December 31, 1997	9-1/4	6-1/8
Quarter ended March 31, 1998	8	5-1/2

There were approximately 358 holders of record of the Company's Common Stock as of March 31, 1999.

The Company has paid no cash dividends on its Common Stock. The loan agreement relating to certain bonds issued by the South Dakota Economic Development Finance Authority restricts the Company's ability to pay dividends on its capital stock.

ITEM 6. SELECTED FINANCIAL DATA.

	YEAR ENDED MARCH 31				
	1999	1998	1997	1996	1995
Statements of Operations Data					
Revenues	$ 722,030	$ 2,190,637	$ 2,769,270	$ 2,485,833	$ 2,028,485
Net loss	(2,513,798)	(967,767)	(11,023)	(92,474)	(468,681)
Net loss per share, basic and diluted	(.30)	(.12)	--	(.01)	(.06)
Weighted average number of shares, basic and diluted	8,512,274	8,376,661	8,192,879	7,734,082	7,325,970
Balance Sheet Data					
Total assets	$ 6,804,976	$ 9,629,912	$ 9,419,398	$ 4,756,349	$ 3,063,097
Long-term obligations, including current portion	3,214,712	3,609,652	3,829,004	445,000	540,000
Shareholders' equity	3,389,295	5,859,863	5,412,968	4,107,228	2,385,037

The above selected financial data should be read in conjunction with the financial statements and related notes included under Item 8 of this Report and "Management's Discussion and Analysis of Financial Condition and Results of Operations" appearing in Item 7 hereof.

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

GENERAL

The Company is engaged in the business of designing, manufacturing, and marketing optical components and various optoelectronic products. For several years, the Company also received significant revenues from providing research and development services in connection with projects sponsored by various government agencies. In fiscal 1998, the Company determined to shift its emphasis from research and development to product development, with the intent to eventually manufacture and market various products. Accordingly, revenues from research and development contracts have decreased significantly during the last two fiscal years.

For the last several years the Company's goal has been to manufacture and market products/components based on its technology developments. The Company selected two product areas: dense wavelength division multiplexer (DWDM) components for fiber optic communications and gallium nitride-based ultraviolet (UV) detectors (both components and integrated detector/electronic/display packages). These areas were selected due to significant potential markets and the Company's expertise and/or patent positions. If the Company is successful in manufacturing and marketing these products, the Company expects to significantly increase its revenues and achieve profitability.

In order to perform product development and production, the Company needs to fully utilize its personnel and facilities. The Company could only accomplish this by reducing its emphasis on R&D contracts, realizing that this shift will significantly reduce revenues and increase losses until the Company realizes revenues from its products. Although the Company has purchased a significant amount of equipment in recent fiscal years, it will still need additional equipment as well as additional personnel to meet its objectives.

RESULTS OF OPERATIONS

Fiscal 1999 Compared to Fiscal 1998. Operating revenues for fiscal 1999 were $722,030, a decrease of 67% from operating revenues of $2,190,637 in fiscal 1998. The decrease in revenues reflects the Company's decision to focus on product development rather than contract research and development. Contract fees decreased from $1,950,844 in fiscal 1998 to $484,329 in fiscal 1999, and the Company's backlog of uncompleted contracts at March 31, 1999 was $189,000 as compared to $1,200,000 at March 31, 1998. Revenues from sales of products decreased by approximately 1% as compared to fiscal 1998. Sales of new products in fiscal 1999 were minimal; however, the Company believes it has made significant progress in developing its new products and the related manufacturing processes and that there will be revenues from sales of such products in fiscal 2000.

Cost of sales increased by approximately 52%, to $1,366,105, in fiscal 1999 from $901,538 in fiscal 1998. Cost of contract fees decreased by 41% in fiscal 1999, reflecting the decreased revenues from contract research and development. Gross margin for product sales was negative in both fiscal 1999 and fiscal 1998, reflecting continued personnel and product development costs. Gross margin for contract fees was negative in fiscal 1999 and 27% in fiscal 1998. This deterioration is the result of decreased contract revenues. Research and development expenses increased by approximately 13% in fiscal 1999, to $382,445 from $338,615, and selling, general and administrative expenses increased by 18% to $727,988 in fiscal 1999 compared to $616,532 in fiscal 1998. The increase in costs of sales, research and development and selling, general and administrative expenses reflects the Company's focus on product development, including the hiring of additional personnel for production, marketing, and sales.

The Company reported a loss from operations in fiscal 1999 of $2,591,750, a substantial increase over the loss from operations of $1,096,626 in fiscal 1998. This loss results from the combination of significantly decreased revenues without a corresponding decrease in costs and expenses.

The Company realized $228,195 in interest income in fiscal 1999, down 27% from $310,925 in fiscal 1998, reflecting lower average cash balances during the year. Interest expense in fiscal 1999 totaled $149,243, down 18% from $181,066 in fiscal 1998, reflecting reduced balances on outstanding obligations.

The Company's net loss in fiscal 1999 was $2,513,798 compared to $967,767 in fiscal 1998. As noted above, this loss was primarily a result of significantly decreased revenues and significantly higher cost of sales and other operating expenses. Further losses can be expected until revenues from production increase, or operating costs decrease, sufficiently to produce positive cash flow.

Fiscal 1998 Compared to Fiscal 1997. Operating revenues for fiscal 1998 were $2,190,637, a decrease of 21% from operating revenues of $2,769,270 for fiscal 1997. This decrease was primarily the result of decreased fees from government contracts in fiscal 1998 ($1,950,844) as compared to fiscal 1997 ($2,581,005). The Company had record contract fees during fiscal 1997 as compared to prior years. Contract revenues were down for two reasons. First, the Company decided to emphasize the product development, manufacturing and marketing of its technology based products. This product emphasis also affected the Company's backlog of research contracts, which was down to $1,200,000 at March 31, 1998, as compared to $3,200,000 at March 31, 1997. APA's product development efforts resulted in the start of operations at its Aberdeen, South Dakota, facility, with the manufacture of GaN-based UV detectors. The second reason for the decrease in contract revenues was the unilateral termination of one contract by the contracting agency.

Cost of sales in fiscal 1998 increased by 182% to $901,538 as compared to $319,626 in fiscal 1997. The greatest portion of these costs were associated with the new production facility in Aberdeen. Cost of contract fees decreased by approximately 11% in fiscal 1998 to $1,430,578 from $1,609,574, reflecting in part reduced contract revenues. The decrease in gross margin for contract fees (from 38% in fiscal 1997 to 27% in fiscal 1998) also results from decreased contract revenues. Research and development and selling general and administrative expenses both decreased in fiscal 1998 as compared to fiscal 1997.

The Company's loss from operations in fiscal 1998 was $1,096,626 as compared to a loss of $128,768 in fiscal 1997. This significantly increased loss reflected both the decrease in revenues and the increased expenses associated with the production facility in Aberdeen.

In fiscal 1998 interest income increased by approximately 13%, to $310,925 from $274,976 in fiscal 1997, and interest expense increased by approximately 16%, to $181,066 in fiscal 1998 from $156,231 in fiscal 1997. These increases reflected higher cash and cash equivalent balances and higher balances on outstanding debt.

The Company's net loss in fiscal 1998 of $967,767, or $.12 per share, as compared to the net loss in fiscal 1997 of $11,023, or $.00 per share, results from the factors noted above.

LIQUIDITY AND CAPITAL RESOURCES

The Company's cash and cash equivalents balance at March 31, 1999, is $2,812,849 as compared to $5,184,215 at March 31, 1998. This reduction primarily results from the use of $1,974,790 net cash in operating activities, of which the most significant cause was the Company's net loss of $2,513,798. The Company used $236,891 net cash in investing activities in fiscal 1999, all for the purchase of property and equipment. This compares to use of net cash of $925,494 and $1,347,358 in fiscal 1998 and fiscal 1997. In all three years, such property and equipment was purchased primarily for the Aberdeen facility. During fiscal 1999, the Company used $159,685 net cash in financing activities. The Company paid the $240,000 balance on a loan from the Minnesota Agricultural and Economic Development Board. This loan had been funded in 1989 for the purchase of equipment for the Company's manufacturing facility in Blaine. A portion of this repayment was made with $125,000 held in a bond reserve account.

In connection with the construction of the manufacturing facility in Aberdeen, the Company took advantage of certain economic incentive programs offered by the State of South Dakota and the City of Aberdeen. At March 31, 1999, the total principal outstanding on the several loans obtained in connection with these financing packages was $3,214,712. Interest on the loans ranges from 0% to 6.75%, and the loans are due between 2003 and 2016. For further information regarding these loans, see Note 5 of Notes to Financial Statements included under Item 8 of this Report. These loans require that the Company maintain certain minimum levels of net worth and income to outstanding debt ratios. The Company was out of compliance with these covenants in fiscal 1999. Such noncompliance does not constitute an event of default but triggers further covenants under the loan agreement, with which the Company was in compliance at March 31, 1999.

The Company anticipates approximately $250,000 in capital expenditures in fiscal 2000, primarily for equipment. The funds for these purchases will come from funds available under the financing packages with the State of South Dakota and the City of Aberdeen.

The Company's use of net cash in operating activities during fiscal 1999 and the related decrease in its cash balance emphasizes the Company's need to increase sales in order to maintain its operations. The auditor's report on the fiscal 1999 financial statements contain a qualification as to the Company's ability to continue as a going concern in light of its low sales and high costs. For the past several years, the Company has been working on the design and development of new optoelectronic products, in particular a dense wavelength division multiplexer and products based on Gallium Nitride technology. In order to focus on these efforts, beginning in fiscal 1998 the Company reduced its emphasis on contract research and development, resulting in significantly reduced revenues. This shift in emphasis was necessary to utilize the Company's personnel and facilities in the product development effort. The Company believes that design of the new products and the manufacturing process is now essentially complete, and it has stepped up its efforts to market these products. A newly hired marketing team has identified several potential markets and customers. The Company believes that it can generate sufficient revenues from sales of these products to sustain its operations through the next fiscal year. If the Company does not adequately increase revenues, it plans to decrease expenses by reducing inventory and personnel and to discontinue one or more products. In addition, the Company will investigate sources of additional capital. There can be no assurance, however, that the Company will be successful in achieving its plans or obtaining additional financing, if needed.

YEAR 2000 READINESS

The Company's year 2000 plan has been primarily directed toward ensuring that the Company will be able to perform critical functions, such as manufacturing, handling of all financial transactions, and maintaining integrity of other business operations, controls, financial reporting, security and other matters. The Company has engaged in an assessment of year 2000 readiness both internally and with its various business partners, including vendors and service providers. The Company has determined that substantially all software, operating systems, and accounting systems have been corrected or are year 2000 compliant. Its security system and telephone systems are year 2000 compliant. The Company has contacted its various business partners to receive assurances that such entities are year 2000 compliant. The cost associated with the Company's year 2000 readiness program has not been material to date and the Company expects that any future costs will also not be material and will have no adverse effect on the Company's earnings or financial position.

FORWARD LOOKING STATEMENTS

Statements in this Report with respect to future sales prospects and other matters to occur in the future are forward looking statements and are subject to uncertainties from factors, many of which are beyond the Company's control. These factors include, but are not limited to, the continued development of the Company's products, acceptance of those products by potential customers, the Company's ability to sell such products at a profitable price, the Company's readiness for year 2000, and the Company's ability to fund its operations.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

The Company's operations are not currently subject to market risks for interest rates, foreign currency exchange rates, commodity prices or other market price risks of a material nature.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.

APA OPTICS, INC.

Financial Statements

Years ended March 31, 1999, 1998 and 1997

Page

Report of Independent Auditors

The Board of Directors and Shareholders
APA Optics, Inc.

We have audited the accompanying balance sheets of APA Optics, Inc. as of March 31, 1999 and 1998, and the related statements of operations, shareholders' equity and cash flows for each of the three years in the period ended March 31, 1999. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of APA Optics, Inc. at March 31, 1999 and 1998, and the results of its operations and its cash flows for each of the three years in the period ended March 31, 1999, in conformity with generally accepted accounting principles.

As discussed in Note 2 to the financial statements, the Company's accumulated deficit and recurring losses from operations raise substantial doubt about its ability to continue as a going concern. The financial statements do not include any adjustments that may result from the outcome of this uncertainty.

May 14, 1999

APA Optics, Inc.

Balance Sheets

	MARCH 31 1999	MARCH 31 1998
ASSETS		
Current assets:		
Cash and cash equivalents	$ 2,812,849	$ 5,184,215
Accounts receivable	85,091	236,284
Inventories:		
Raw materials	54,208	11,965
Work-in-process	167,659	145,156
Prepaid expenses	18,911	22,975
Bond reserve funds	60,000	131,667
Total current assets	3,198,718	5,732,262
Property, plant and equipment	2,592,503	2,702,887
Other assets:		
Bond reserve funds	533,100	653,458
Bond placement costs	212,012	260,012
Other	268,643	281,293
	1,013,755	1,194,763
Total assets	$ 6,804,976	$ 9,629,912

	MARCH 31 1999	MARCH 31 1998
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 53,416	$ 36,960
Accrued expenses	147,553	123,437
Current maturities of long-term debt	133,200	226,385
Total current liabilities	334,169	386,782
Long-term debt	3,081,512	3,383,267
Shareholders' equity		
Undesignated shares; 5,000,000 shares authorized, none issued		
Common stock, $.01 par value:		
Authorized shares - 20,000,000		
Issued and outstanding shares - 8,512,274	85,123	85,123
Additional paid-in capital	9,700,258	9,657,028
Accumulated deficit	(6,396,086)	(3,882,288)
Total shareholders' equity	3,389,295	5,859,863
Total liabilities and shareholders' equity	$ 6,804,976	$ 9,629,912

SEE ACCOMPANYING NOTES.

APA Optics, Inc.

Statements of Operations

	YEAR ENDED MARCH 31 1999	1998	1997

<S>	<C>	<C>	<C>
Revenues:			
Net sales	$ 237,701	$ 239,793	$ 188,265
Contract fees	484,329	1,950,844	2,581,005
	722,030	2,190,637	2,769,270
Costs and expenses:			
Cost of sales	1,366,105	901,538	319,626
Cost of contract fees	837,242	1,430,578	1,609,574
Research and development	382,445	338,615	374,604
Selling, general and administrative	727,988	616,532	594,234
	3,313,780	3,287,263	2,898,038
Loss from operations	(2,591,750)	(1,096,626)	(128,768)
Interest income	228,195	310,925	274,976
Interest expense	(149,243)	(181,066)	(156,231)
Loss before income taxes	(2,512,798)	(966,767)	(10,023)
Income taxes	1,000	1,000	1,000
Net loss	$(2,513,798)	$ (967,767)	$ (11,023)
Net loss per share:			
Basic and diluted	$ (.30)	$ (.12)	$ --
Weighted average shares outstanding:			
Basic and diluted	8,512,274	8,376,661	8,192,879

</TABLE>

SEE ACCOMPANYING NOTES.

APA Optics, Inc.

Statement of Shareholders' Equity

<TABLE>
<CAPTION>

	COMMON STOCK		ADDITIONAL PAID-IN	ACCUMULATED
	SHARES	AMOUNT	CAPITAL	DEFICIT
<S>	<C>	<C>	<C>	<C>
Balance March 31, 1996	7,990,007	$ 79,900	$ 6,930,826	$(2,903,498)
Stock options exercised, net	2,000	20	3,605	--
Warrants exercised	24,625	246	81,017	--
Shares issued under private stock offering to Aberdeen Group, net of issuance costs	289,992	2,900	1,197,100	--
Warrants issued for services in connection with bond financing	--	--	31,875	--
Net loss	--	--	--	(11,023)
Balance March 31, 1997	8,306,624	83,066	8,244,423	(2,914,521)
Stock options exercised, net	3,500	35	7,871	--
Warrants exercised	202,150	2,022	1,343,861	--
Warrants issued in lieu of debt service payments	--	--	60,873	--
Net loss	--	--	--	(967,767)

Balance March 31, 1998	8,512,274	85,123	9,657,028	(3,882,288)
Warrants issued in lieu of debt service payments	--	--	43,230	--
Net loss	--	--	--	(2,513,798)
Balance March 31, 1999	8,512,274	$ 85,123	$ 9,700,258	$(6,396,086)

</TABLE>

SEE ACCOMPANYING NOTES.

APA Optics, Inc.

Statements of Cash Flows

<TABLE>
<CAPTION>

	YEAR ENDED MARCH 31 1999	1998	1997
<S>	<C>	<C>	<C>
OPERATING ACTIVITIES			
Net loss	$(2,513,798)	$ (967,767)	$ (11,023)
Adjustments to reconcile net loss to net cash (used in) provided by operating activities:			
Depreciation and amortization	443,275	426,362	457,173
Changes in operating assets and liabilities:			
Accounts receivable	151,193	119,697	50,871
Inventories	(64,746)	(8,758)	(17,564)
Costs in excess of billings on research contracts	--	--	210,658
Prepaid expenses and other assets	(31,286)	(31,548)	(26,921)
Accounts payable and accrued expenses	40,572	(17,029)	(26,695)
Net cash (used in) provided by operating activities	(1,974,790)	(479,043)	636,499
INVESTING ACTIVITIES			
Purchases of property and equipment	(236,891)	(925,494)	(1,347,358)
Net cash used in investing activities	(236,891)	(925,494)	(1,347,358)
FINANCING ACTIVITIES			
Proceeds from sales of common stock	--	1,353,789	1,284,888
Long-term debt proceeds	--	--	3,520,000
Repayment of long-term debt	(351,710)	(158,479)	(135,996)
Bond placement costs	--	--	(253,720)
Bond reserve funds	192,025	1,518,237	(2,085,417)
Net cash (used in) provided by financing activities	(159,685)	2,713,547	2,329,755
(Decrease) increase in cash and cash equivalents	(2,371,366)	1,309,010	1,618,896
Cash and cash equivalents at beginning of year	5,184,215	3,875,205	2,256,309
Cash and cash equivalents at end of year	$ 2,812,849	$ 5,184,215	$ 3,875,205
SUPPLEMENTAL DISCLOSURES OF NONCASH INVESTING AND FINANCING ACTIVITIES			
Warrants issued in lieu of debt service payments	$ 43,230	$ 60,873	$ --
Warrants issued for services in connection with bond financing	--	--	31,875

</TABLE>

SEE ACCOMPANYING NOTES.

APA Optics, Inc.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

NATURE OF BUSINESS

APA Optics, Inc. (the "Company") is engaged in the business of developing, designing and fabricating optical components and optical systems for laser and other industrial applications.

REVENUE RECOGNITION

Sales are recorded upon shipment of product.

Revenue on contract fees is recorded on the percentage of completion method of accounting for long-term government contracts. A portion of the total contract price is recognized on the basis of contract costs incurred to date as compared to the expected total cost of the contract. Contract costs include direct materials, labor and manufacturing overhead. Estimated losses on uncompleted contracts are recorded in their entirety in the period in which they are determined.

During 1999, the Company received a $75,000 grant from the State of South Dakota when the Company hired its tenth employee at its Aberdeen, South Dakota production facility. The grant was designed to offset the costs of training new employees.

CASH EQUIVALENTS

The Company considers all highly liquid investments with a majority of three months or less when purchased to be cash equivalents. Investments classified as cash equivalents consist primarily of certificates of deposit. The fair value of investments approximates cost.

INVENTORIES

Inventories are stated at the lower of cost or market. Cost is determined by the first-in, first-out (FIFO) method for raw materials, actual cost for direct labor and average cost for factory overhead in work-in-process.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

PROPERTY, PLANT AND EQUIPMENT

Property and equipment are stated at cost. Depreciation is provided on the straight-line method over the following estimated useful lives of the assets:

	YEARS
Building	20
Manufacturing equipment	7 - 10
Tools	3 - 7
Office equipment	5 - 10
Leasehold improvements	15

BOND PLACEMENT COSTS

Bond placement costs are amortized over 5 - 8 years.

USE OF ESTIMATES

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results may differ from those estimates.

INCOME TAXES

The Company accounts for income taxes using the liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to temporary differences between the financial statement carrying amounts of assets and liabilities and their respective tax basis.

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

EARNINGS PER SHARE

Basic and diluted earnings per share are calculated in accordance with Financial Accounting Standards Board (FASB) Statement No. 128, EARNINGS PER SHARE. Basic and diluted earnings per share are the same as the effect of outstanding stock options and warrants is antidilutive.

IMPAIRMENT OF LONG-LIVED ASSETS

The Company records losses on long-lived assets in operations when events and circumstances indicate that the estimate of undiscounted future cash flows expected to be generated by those assets are less than the assets' carrying amount.

2. GOING CONCERN

The accompanying financial statements have been prepared on the basis that the Company will continue as a going concern, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. The Company has an accumulated deficit of $6,396,086 at March 31, 1999. In order to focus on the design and development of new optoelectronic products, the Company has reduced its emphasis on contract research and development, resulting in significantly reduced revenues over the last two fiscal years. The Company believes that design of the new products and the manufacturing process is essentially complete and has stepped up its efforts to market these products. The Company believes that it can generate sufficient revenues from sales of these products to sustain its operations through the next fiscal year. If the Company does not adequately increase revenues, it plans to decrease expenses by reducing inventory and personnel and to discontinue one or more products. In addition, the Company will investigate sources of additional capital. There can be no assurance, however, that the Company will be successful in achieving its plans or obtaining additional financing.

Due to the uncertainty regarding the achievability of management's plans, no assurance can be given as to the Company's ability to continue as a going concern. The financial statements do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amount and classification of liabilities that may result from the possible inability of the Company to continue as a going concern.

3. ACCOUNTS RECEIVABLE

Accounts receivable includes $21,032 billed under retainage provisions of government contracts in 1999 ($34,907 in 1998).

4. PROPERTY, PLANT AND EQUIPMENT

Property, plant and equipment consists of the following:

	MARCH 31	
	1999	1998
Land	$ 60,000	$ 60,000
Building	1,679,424	1,679,424
Manufacturing equipment	3,899,744	3,665,116
Tools	88,092	88,092
Office equipment	188,884	186,621
Leasehold improvements	536,447	536,447
	6,452,591	6,215,700
Less accumulated depreciation	3,860,088	3,512,813
	$2,592,503	$2,702,887

5. LONG-TERM DEBT

Long-term debt consists of the following:

	MARCH 31 1999	1998
7% Minnesota Agricultural and Economic Development Board Bond, due in increasing serial maturities through fiscal year ending March 31, 2000, secured by manufacturing equipment. Fully redeemed August 1998	$ --	$ 240,000
Debt associated with the production facility in Aberdeen, South Dakota, secured by land and buildings	3,214,712	3,369,652
	3,214,712	3,609,652
Less current maturities	133,200	226,385
	$3,081,512	$3,383,267

5. LONG-TERM DEBT (CONTINUED)

In December 1989, the Company entered into a loan agreement with the Minnesota Agricultural and Economic Development Board to provide bond financing for the expansion of manufacturing facilities. These bonds were fully redeemed August 1, 1998. At March 31, 1998, the Company had on deposit with trustees $211,417 in reserve for future payments on these bonds of which $76,667 was held in escrow for the payment of current bond maturities.

In June 1996, the Company began construction of its new production facility in Aberdeen, South Dakota to fabricate wavelength division multiplexed modulators. As part of its financing of the facility, the Company has received economic assistance from the State of South Dakota Governor's Office of Economic Development and the Aberdeen Development Corporation (the parties) as follows:

Proceeds:	
Bond financing for building construction and equipment	$1,895,000
Low interest loans	875,000
Forgivable loans	750,000
Equity investment - purchase of 288,992 shares of common stock	1,200,000
	$4,720,000

The following is a summary of the outstanding debt at March 31 related to the Aberdeen facility:

	1999	1998
South Dakota Governor's Office of Economic Development and the Aberdeen Development Corporation Bond, 5% to 6.75% due in various installments through 2016	$1,840,000	$1,895,000
Low interest loans, 0% to 3% due in various installments through 2016	586,107	601,573
Forgivable loans, 3% due in various installments through 2003	788,605	873,079
	$3,214,712	$3,369,652

5. LONG-TERM DEBT (CONTINUED)

The forgivable loans are contingent upon employment levels at the facility meeting preset criteria. In exchange for any loans forgiven, the Company will grant warrants to purchase common stock of the Company based on the number of job credits earned by the Company in the preceding 12 months divided by the exercise price. As of March 31, 1999, 23,864 warrants have been issued for loans forgiven totaling $104,103. The carrying value of the low interest loans and forgivable loans, based on similar instruments, approximates market at March 31, 1999 and 1998.

At March 31, 1999 and 1998, the Company had on deposit with trustees $593,100 and $573,708 in reserve funds for current bond maturities of which $60,000 and $55,000 are held in escrow. These funds are included in bond reserve funds in the accompanying balance sheets. The loan agreement requires the Company to maintain certain minimum levels of net worth and to maintain certain income to outstanding debt ratios. The Company was out of compliance with these covenants in fiscal 1999. Such noncompliance does not constitute an event of default, but triggers further covenants under the loan agreement with which the Company is in compliance at March 31, 1999. The carrying value of the bonds approximates market value at March 31, 1999 and 1998.

In addition, the Company has available $300,000 in promissory notes, available until July 1, 1999, to be used for the purchase of equipment in the new facility. There were no outstanding borrowings under this arrangement at March 31, 1999 and 1998.

As partial payment of expenses related to the Aberdeen financing, the Company issued warrants to purchase 31,875 shares of the Company's common stock at an exercise price of $4.00 per share. The warrants expire in March 2002. The value assigned to the warrants of $31,875 has been capitalized as bond placement costs and is amortized over the life of the loan agreement.

As part of the Company's plan to construct this production facility, the city of Aberdeen, South Dakota gave the Company land with an approximate fair market value of $250,000. The gift was contingent upon the Company staying in the new building through June 23, 2002.

Interest paid during fiscal year 1999, 1998 and 1997 was $149,243, $181,066 and $156,231, respectively.

5. LONG-TERM DEBT (CONTINUED)

Maturities of long-term debt are as follows (assuming no debt is forgiven): 2000 - - $133,200; 2001 - $139,890; 2002 - $372,907; 2003 - $523,701; 2004 - $310,709; thereafter - $1,734,305.

6. INCOME TAXES

As of March 31, 1999, the Company has net operating loss carryovers for federal income tax purposes of approximately $6,616,000 expiring in fiscal years 2001 to 2018 and $43,000 in research and development credits expiring in fiscal 2001which can be used to offset federal income taxes.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts used for financial reporting purposes and the amounts used for income tax purposes. Significant components of the Company's deferred taxes are as follows:

	MARCH 31	
	1999	1998
Net operating losses	$ 2,113,000	$ 1,405,000
Depreciation	6,000	11,000
Research and development credits	43,000	43,000
Other	71,000	24,000
Total deferred tax asset	2,233,000	1,483,000
Less valuation allowance	(2,233,000)	(1,483,000)
Net deferred taxes	$ --	$ --

Income tax expense consists of state taxes in 1999, 1998 and 1997.

7. SHAREHOLDERS' EQUITY

The Board of Directors may by resolution establish from the undesignated shares different classes or series of shares and may fix the relative rights and preferences of shares in any class or series.

8. STOCK OPTIONS AND WARRANTS

In fiscal 1998 and 1997, certain shareholders tendered 2,500 and 2,000 shares, respectively, of common stock as substantial payment for 6,000 and 4,000 shares, respectively, purchased upon exercise of their stock options.

Option activity is summarized as follows:

	SHARES AVAILABLE FOR GRANT	OPTIONS OUTSTANDING	WEIGHTED AVERAGE EXERCISE PRICE PER SHARE
Balance March 31, 1996	236,338	10,000	$ 3.94
Additional shares reserved	500,000	--	--
Granted	(75,000)	75,000	5.19
Exercised	--	(4,000)	3.50
Balance March 31, 1997	661,338	81,000	5.20
Additional shares reserved	500,000	--	--
Granted	(25,000)	25,000	6.19
Exercised	--	(6,000)	4.22
Canceled	70,000	(70,000)	5.19
Balance March 31, 1998	1,206,338	30,000	6.10
Granted	(252,500)	252,500	4.09
Canceled	20,000	(20,000)	6.24
Balance March 31, 1999	973,838	262,500	$ 4.18

The Company has various incentive and non-qualified stock option plans which are used as an incentive for directors, officers and other employees, consultants and technical advisors. Options are granted at fair market values determined on the date of grant and vesting normally occurs over a four-year period.

The number of shares exercisable at March 31, 1999, 1998 and 1997 was 15,000, 5,000 and 6,000, respectively, at a weighted average exercise price of $5.70, $5.65 and $4.88 per share, respectively.

8. STOCK OPTIONS AND WARRANTS (CONTINUED)

The weighted average fair value of options granted in 1999, 1998 and 1997 was $2.05, $2.83 and $2.99 per share, respectively. The exercise price of options outstanding at March 31, 1999 ranged from $3.77 to $5.73 per share.

Pro forma information regarding net loss and net loss per share is required by FASB Statement No. 123, and has been determined as if the Company had accounted for its employee stock options under the fair value method of Statement 123. The fair value for these options was estimated at the date of grant using a Black-Scholes option pricing model with the following weighted-average assumptions for 1999, 1998 and 1997, respectively: risk-free interest rates of 4.55%, 5.61% and 6.54%, volatility factor of the expected market price of the Company's common stock of .48, .44 and .60 and a weighted-average expected life of the options of 5 years.

The Black-Scholes option valuation model was developed for use in estimating the fair value of traded options which have no vesting restrictions and are fully transferable. In addition, option valuation models require the input of highly subjective assumptions. Because the Company's employee stock options have characteristics significantly different from those of traded options, and because changes in the subjective input assumptions can materially affect the fair value statement, in management's opinion, the existing models do not necessarily provide a reliable single measure of the fair value of its employee stock options.

For purposes of pro forma disclosures, the estimated fair value of the options is amortized to expense over the options' vesting period. The Company's pro forma information is as follows:

	1999	1998	1997
Pro forma net loss	$(2,626,002)	$(991,568)	$(16,249)
Pro forma net loss per common share - basic and diluted	$(.31)	$(.12)	$ --

These pro forma amounts may not be indicative of future years' amounts.

8. STOCK OPTIONS AND WARRANTS (CONTINUED)

The following is a table of the warrants to purchase shares of the Company's common stock:

	WARRANTS OUTSTANDING	EXERCISE PRICE PER SHARE	EXPIRATION DATE
Balance at March 31, 1996	415,000	$3.30 - $6.75	1996 - 2001
Granted	31,875	4.00	2000
Exercised	(24,625)	3.30	2001
Expired	(20,375)	3.30	1996
Balance at March 31, 1997	401,875	3.30 - 6.75	1997 - 2002
Granted	15,218	4.00	2003
Exercised	(202,150)	3.30 - 6.75	1997 - 1999
Expired	(103,250)	6.75	1997
Balance at March 31, 1998	111,693	3.30 - 4.00	1999 - 2003
Granted	8,646	5.00	2004
Balance at March 31, 1999	120,339	$3.30 - $5.00	1999 - 2004

9. COMMITMENTS

The Company leases office and manufacturing facilities from a partnership whose two partners are major shareholders and officers of the Company. The lease agreement, classified as an operating lease, expires November 30, 1999 and provides for periodic increases of the rental rate based on increases in the consumer price index. Future minimum lease obligations under the lease as of March 31, 1999 are as follows:

Year ending March 31:	
2000	$77,000

Rental expense, all of which was paid to the partnership, was $116,000 in fiscal 1999, $118,000 in fiscal 1998 and $118,000 in fiscal 1997.

10. MAJOR CUSTOMER

Several operating agencies of the U.S. Government account for more than 10% of the Company's net sales and contract fees. Total revenues from the agencies were $484,329 in 1999, $1,950,844 in 1998 and $2,581,005 in 1997 as follows:

1999	1998	1997

Air Force	23%	20%	42%
Army	-	25	22
Navy	18	38	36
ARPA	59	17	-
Total	100%	100%	100%

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE.

None.

PART III

ITEM 10. DIRECTORS AND EXECUTIVE OFFICERS OF THE REGISTRANT.

EXECUTIVE OFFICERS OF THE REGISTRANT

The following is a list of APA Optics, Inc. executive officers, their ages, positions and offices as of March 31, 1999.

NAME	AGE	POSITION
Dr. Anil K. Jain	53	Chief Executive Officer, President, Chief Financial Officer and Treasurer
Kenneth A. Olsen	55	Vice President and Secretary
Randal J. Becker	46	Principal Accounting Officer

DR. ANIL K. JAIN has been a Director and Chief Executive Officer, President, Chief Financial Officer and Treasurer since March 1979. From 1973 until October 15, 1983, when Dr. Jain commenced full time employment with the Company, he was employed at the Systems and Research Center at Honeywell Inc. as a Senior Research Fellow, coordinating optics-related development.

KENNETH A. OLSEN has been a Director since 1980, Secretary since 1983, and Vice President since 1992. Prior to joining the Company, he had been with 3M Corp., St. Paul, Minnesota.

RANDAL BECKER has been Principal Accounting Officer since joining the Company in 1987. Prior to joining the Company he was with Apache Corporation, Minneapolis, Minnesota.

Information regarding Directors is incorporated herein by reference from the Proxy Statement.

ITEM 11. EXECUTIVE COMPENSATION.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS.

The information requested by the above Items 11, 12, and 13 is included in the Proxy Statement, which is incorporated herein by reference.

ITEM 14. EXHIBITS, FINANCIAL STATEMENT SCHEDULES, AND REPORTS ON FORM 8-K.

(a) (1) The following financial statements are filed herewith under Item 8.

(i) Balance Sheets as of March 31, 1998 and 1999

(ii) Statements of Operations for the years ended March 31, 1999, 1998 and 1997

(iii) Statement of Shareholders' Equity for the years ended March 31, 1999, 1998 and 1997

(iv) Statements of Cash Flows for the years ended March 31, 1999, 1998 and 1997

(v) Notes to Financial Statements at March 31, 1999

(2) Financial Statement Schedules: None

(b) Reports filed on Form 8-K:

No reports on Form 8-K were filed during the fourth quarter of the fiscal year ended March 31, 1999.

(c) Exhibits

See Exhibit Index on page 28 of this Report.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

APA Optics, Inc.

Date: June 25, 1999

By /s/ Anil K. Jain
Anil K. Jain
PRESIDENT

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

SIGNATURE	TITLE	DATE
/s/ Anil K. Jain Anil K. Jain	President, Chief Executive Officer, Treasurer, Chief Financial Officer, and Director	June 25, 1999
/s/ Kenneth A. Olsen Kenneth A. Olsen	Secretary, Vice President, and Director	June 25, 1999
/s/ Randal J. Becker Randal J. Becker	Principal Accounting Officer	June 25, 1999
/s/ Gregory Von Wald Gregory Von Wald	Director	June 25, 1999
/s/ William R. Franta William R. Franta	Director	June 25, 1999
/s/ Larry Pressler Larry Pressler	Director	June 25, 1999

EXHIBIT INDEX

<TABLE>
<CAPTION>

NUMBER	DESCRIPTION	PAGE NUMBER OR INCORPORATED BY REFERENCE TO
<S>	<C>	<C>
3.1	Restated Articles of Incorporation, as amended to date, and Statement regarding establishment of class of shares	Exhibit 3.1 to Registrant's Report on Form 10-KSB for the fiscal year ended March 31, 1995
3.2	Bylaws, as amended and restated to date	
4.1(a)	State of South Dakota Board of Economic Development $300,000 Promissory Note, REDI Loan: 95-13-A	Exhibit 4.1(a) to the Report on 10-QSB for the quarter ended June 30, 1996 (the "June 1996 10-QSB")
4.1(b)	State of South Dakota Board of Economic Development Security Agreement REDI Loan No: 95-13-A dated May 28, 1996	Exhibit 4.1(b) to the June 1996 10-QSB
4.2(a)	$700,000 Loan Agreement dated June 24, 1996 by and between Aberdeen Development	Exhibit 4.2(a) to the June 1996 10-QSB

	Corporation and APA Optics, Inc.	
4.2(b)	$300,000 Loan Agreement dated June 24, 1996 between Aberdeen Development Corporation and APA Optics, Inc.	Exhibit 4.2(b) to the June 1996 10-QSB
4.2(c)	$250,000 Loan Agreement dated June 24, 1996 by and between Aberdeen Development Corporation and APA Optics, Inc.	Exhibit 4.2(c) to the June 1996 10-QSB
4.2(d)	$300,000 Loan Agreement dated June 24, 1996 by and between Aberdeen Development Corporation and APA Optics, Inc.	Exhibit 4.2(d) to the June 1996 10-QSB
4.3(a)	Loan Agreement between South Dakota Economic Development Finance and APA Optics, Inc.	Exhibit 4.3(a) to the June 1996 10-QSB
4.3(b)	Mortgage and Security Agreement - One Hundred Day Redemption from APA Optics, Inc. to South Dakota Economic Development Finance Authority dated as of June 24, 1996	Exhibit 4.3(b) to the June 1996 10-QSB
4.4(a)	Subscription and Investment Representation Agreement of NE Venture, Inc.	Exhibit 4.4(a) to the June 1996 10-QSB
4.4(b)	Form of Common Stock Purchase Warrant for NE Venture, Inc.	Exhibit 4.4(b) to the June 1996 10-QSB
10.1	Sublease Agreement between the Registrant and Jain-Olsen Properties and Sublease Agreement and Option Agreement between the Registrant and Jain-Olsen Properties	Exhibit 10.1 to the Registration Statement on Form S-18 filed with the Chicago Regional Office of the Securities and Exchange Commission on June 26, 1986
*10.2a	Stock Option Plan for Nonemployee Directors	Exhibit 10.3a to Registrant's Report on Form 10-KSB for the fiscal year ended March 31, 1994 (the "1994 10-KSB")
*10.2b	Form of option agreement issued under the plan	Exhibit 10.3b to 1994 10-KSB
*10.3	1997 Stock Compensation Plan	Exhibit 10.3 Registrant's Report on Form 10-KSB for the fiscal year ended March 31, 1997

</TABLE>

<TABLE>
<CAPTION>

NUMBER	DESCRIPTION	PAGE NUMBER OR INCORPORATED BY REFERENCE TO
<S>	<C>	<C>
*10.4	Insurance agreement by and between the Registrant and Anil K. Jain	Exhibit 10.5 to Registrant's Report on Form 10-K for the fiscal year ended March 31, 1990
*10.5	Form of Agreement regarding Repurchase of Stock upon Change in Control Event with Anil K. Jain and Kenneth A. Olsen	Exhibit 10.1 to Registrant's Report on Form 10-QSB for the quarter ended September 30, 1997 ("September 1997 10-QSB")
*10.6	Form of Agreement regarding Employment/Compensation upon Change in Control with Messrs. Jain and Olsen	Exhibit 10.2 to the September 1997 10-QSB
27	Financial data schedule	

</TABLE>

*Indicates management contract or compensation plan or arrangements required to be filed as an exhibit to this form.

EXHIBIT 3.2

APA OPTICS, INC.

BYLAWS
(AS AMENDED AND RESTATED EFFECTIVE FEBRUARY 17, 1999)

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AMENDED AND RESTATED BYLAWS OF APA OPTICS, INC.

ARTICLE I: OFFICES

Section 1.01. Registered Office. The registered office of the Company in Minnesota shall be that set forth in the Articles of Incorporation or in the most recent amendment of the Articles of Incorporation or in a certificate prepared by the Board of Directors and filed with the Secretary of State of Minnesota changing the registered office.

Section 1.02. Other Offices. The Company may also have offices and places of business at such other places both within and without the State of Minnesota as the Board of Directors may from time to time determine or the business of the Company may require.

ARTICLE II: MEETINGS OF SHAREHOLDERS

Section 2.01. Place of Meetings. All meetings of the shareholders of the Company shall be held at its registered office or at such other place within or without the State of Minnesota as shall be stated by the Board of Directors in the notice of the meeting. In the absence of designation otherwise, meetings shall be held at the registered office of the Company in the State of Minnesota.

Section 2.02. Time of Meetings. The Board of Directors shall designate the time and day for each meeting. In the absence of such designation, every meeting of the shareholders shall be held at ten o'clock A.M.

Section 2.03. Regular Meetings.

Section 2.03-a. Annual Meetings. Each annual meeting shall be held on a date to be selected by the Board of Directors, subject to the power of the Board of Directors to change the date, or if that day shall fall upon a legal holiday, on the next succeeding business day; except that the Board of Directors may, in its discretion and solely for convenience, determine in any year an annual meeting date falling not earlier than ten (10) days before or later than four (4) days after such designated annual meeting date, or may, for reasonable cause, postpone such annual meeting date to a subsequent date within the same calendar year as designated by the Board of Directors.

Section 2.03-b. Election of Directors. At the annual meeting the shareholders, voting as provided in the Articles of Incorporation or in these Bylaws, may designate any change in the number of Directors to constitute the Board of Directors, shall elect a Board of Directors, and shall transact such other business as may properly come before the meeting.

Section 2.04. Special Meetings. Special meetings of the shareholders may be held at any time and for any purpose and may be called by the Chief Executive Officer, Chief Financial

Officer, any two Directors, or by a shareholder or shareholders holding ten percent (10%) or more of the shares entitled to vote (except that a special meeting for the purpose of considering any action to directly or indirectly effect a business combination, including any action to change or otherwise affect the composition of the Board of Directors for that purpose, must be called by shareholders holding not less than twenty-five percent (25%) of all shares of the Company entitled to vote), who shall demand such special meeting by written notice given to the Chief Executive Officer or the Chief Financial Officer of the Company specifying the purposes of such meeting.

Section 2.05. Notice of Meetings. Notice of meetings shall be in writing and signed by the Chief Executive Officer or any Vice President or the Secretary or any Assistant Secretary, or by such other person or persons as the Board shall designate. Such notice shall state the place, date, and time of the meeting and, in the case of a special meeting, the purpose or purposes for which the meeting is called. A copy of such notice shall be either delivered personally or mailed, postage prepaid, to each shareholder of record entitled to vote at such meeting pursuant to Section 2.13 hereof not less than ten (10) nor more than sixty (60) days before such meeting. If mailed, it shall be directed to each shareholder at his address as it appears upon the records of the Company, and upon such mailing of any such notice, the service thereof shall be complete, and the time of the notice shall begin to run from the date that such notice is deposited in the mail for transmission to such shareholder. Personal delivery of any such notice to a corporation, an association, or a partnership shall be accomplished by personal delivery of such notice to any officer of a corporation or an association or to any member of a partnership.

Section 2.06. Waiver of Notice. Notice of any meeting of the shareholders may be waived before, at, or after such meeting in a writing signed by the shareholder or representative thereof entitled to vote the shares so represented. Such waiver shall be filed with the Secretary or entered upon the records of the meeting.

Section 2.07. Purpose of Special Meetings. Business transacted at any special meeting of the shareholders shall be limited to the matters stated in the notice, or other matters necessarily incidental thereto.

Section 2.08. Quorum; Adjournment. The holders of a majority of the stock issued and outstanding and entitled to vote, present in person or represented by proxy, shall constitute a quorum for the transaction of business at all meetings of the shareholders, except as may be otherwise provided by statute or by the Articles of Incorporation. If, however, such quorum shall not be present or represented at any meeting of the shareholders, the shareholders entitled to vote thereat, present in person or represented by proxy, shall have the power to adjourn the meeting from time to time, without notice other than announcement at such meeting, until a quorum shall be present or represented. At such adjourned meeting at which a quorum shall be present or represented, any business may be transacted which might have been transacted at the original meeting in accordance with the notice thereof. If a quorum is present when a duly called or held meeting is convened, the shareholders present in person or represented by proxy may continue to transact business until adjournment notwithstanding the withdrawal of enough shareholders originally present in person or by proxy to leave less than a quorum.

Section 2.09. Vote Required. When a quorum is present or represented at any meeting, the vote of the holders of a majority of the stock having voting power present in person or represented by proxy shall decide any question brought before such meeting, unless the question is one that by express provision of statute or of the Articles of Incorporation or of these Bylaws requires a different vote, in which case such express provision shall govern the vote required.

Section 2.10. Voting Rights. Except as may be otherwise required by statute or the Articles of Incorporation or these Bylaws, every shareholder of record of the Company shall be entitled at each meeting of the shareholders to one vote for each share of stock standing in his name on the books of the Company.

Section 2.11. Proxies. At any meeting of the shareholders, any shareholder may be represented and vote by a proxy or proxies appointed by an instrument in writing and filed with the Secretary at or before the meeting. An appointment of a proxy or proxies for shares held jointly by two or more shareholders is valid if signed by any one of them, unless and until the Company receives from any one of those shareholders written notice denying the authority of such other person or persons to appoint a proxy or proxies or appointing a different proxy or proxies. In the event that any instrument shall designate two or more persons to act as proxies, a majority of such persons present at the meeting, or if only one shall be present then that one, shall have and may exercise all of the proxies so designated unless the instrument shall otherwise provide. If the proxies present at the meeting are equally divided on an issue, the shares represented by such proxies shall not be voted on such issue. No proxy shall be valid after the expiration of eleven (11) months from the date of its execution unless coupled with an interest or unless the person executing it specifies therein the length of time for which it is to continue in force, which in no case shall exceed three (3) years from the date of its execution. Subject to the above, any duly executed proxy shall continue in full force and effect and shall not be revoked unless written notice of its revocation or a duly executed proxy bearing a later date is filed with the Secretary of the Company.

Section 2.12. Action in Writing. Except as may be otherwise required by statute or the Articles of Incorporation, any action required or permitted to be taken at any meeting of the shareholders of the Company may be taken without a meeting, without prior notice, and without a vote, if a consent in writing, setting forth the action so taken, shall be signed by all of the holders of the shares of outstanding stock that would be entitled to vote thereon at a meeting of the shareholders.

Section 2.13. Closing of Books; Record Date. The Board of Directors may fix a date, not exceeding sixty (60) days preceding the date of any meeting of the shareholders of the Company, as a record date for the determination of the shareholders entitled to notice of and to vote at such meeting, and in such case only shareholders of record on the date so fixed or their legal representatives shall be entitled to notice of and to vote at such meeting, notwithstanding any transfer of shares on the books of the Company after any record date so fixed. The Board of Directors may close the books of the Company against the transfer of shares during the whole or any part of such period. If the Board of Directors fails to fix such a record date, the record date shall be the twentieth (20th) day preceding the date of such meeting.

Section 2.14. Advance Notice Requirements.

Section 2.14-a. Notice of Nomination of Directors. Only persons who are nominated in accordance with the procedures set forth in this Section 2.14-a shall be eligible for election as Directors. Nominations of persons for election to the Board of Directors of the Company may be made at a meeting of shareholders (a) by or at the direction of the Board of Directors or (b) by any shareholder of the Company entitled to vote for the election of Directors at the meeting who complies with the notice procedures set forth in this Section 2.14-a. Nominations by shareholders shall be made pursuant to timely notice in writing to the Secretary of the Company. To be timely, a shareholder's notice must be delivered to the Secretary of the Company, or mailed and received at the principal executive office of the Company, not less than 90 days prior to the first anniversary date of the prior year's annual meeting. If, however, the date of the annual meeting of shareholders is more than 30 days before or after such anniversary date, notice by a shareholder shall be timely only if so delivered, or so mailed and received, not less than 90 days before such annual meeting or, if later, within 10 days after the first public announcement of the date of such annual meeting. If a special meeting of shareholders of the Company is called in accordance with Section 2.04 of these Bylaws for the purpose of electing one or more Directors to the Board of Directors or if a regular meeting other than an annual meeting is held, for a shareholder's notice of nominations to be timely it must be delivered to the Secretary of the Company, or mailed and received at the principal executive office of the Company, not less than 90 days before such special meeting or such regular meeting or, if later, within 10 days after the first public announcement of the date of such special meeting or such regular meeting. Except to the extent otherwise required by law, the adjournment of a regular or special meeting of shareholders shall not commence a new time period for the giving of a shareholder's notice as described above. Such shareholder's notice shall set forth (x) as to each person whom the shareholder proposes to nominate for election or re-election as a Director, (i) such person's name and (ii) all information relating to such person that is required to be disclosed in solicitations of proxies for election of Directors, or is otherwise required, pursuant to Regulation 14A under the Securities Exchange Act of 1934, as amended (including such person's written consent to being named in the proxy statement as a nominee and to serving as a Director if elected); and (y) as to the shareholder giving the notice, (i) the name and address, as they appear on the Company's books, of such shareholder and (ii) the class and number of shares of the Company which are beneficially owned by such shareholder. At the request of the Board of Directors, any person nominated by the Board of Directors for election as a Director shall furnish to the Secretary of the Company that information required to be set forth in a shareholder's notice of nomination which pertains to a nominee. Notwithstanding anything in these Bylaws to the contrary, no person shall be eligible for election as a Director of the Company unless nominated in accordance with the procedures set forth in this Section 2.14-a. The Chairman of the meeting shall, if the facts warrant, determine that a nomination was not made in accordance with the procedures prescribed in this Section 2.14-a and, if the Chairman should so determine, the Chairman shall so declare to the meeting and the defective nomination shall be disregarded.

Section 2.14-b. Advance Notice of Business to be Conducted. At any regular or special meeting of shareholders, only such business shall be conducted as shall have been brought before the meeting (a) by or at the direction of the Board of Directors or (b) by any shareholder of the Company who complies with the notice procedures set forth in this Section 2.14-b. For business to be properly brought before any regular or special meeting by a shareholder, the shareholder must have given timely notice thereof in writing to the Secretary of the Company. To be timely, a shareholder's notice of any such business to be conducted at an annual meeting must be delivered to the Secretary of the Company, or mailed and received at the principal executive office of the Company, not less than 90 days prior to the first anniversary date of the prior year's annual meeting. If, however, the date of the annual meeting of shareholders is more than 30 days before or after such anniversary date, notice by a shareholder shall be timely only if so delivered, or so mailed and received, not less than 90 days before such annual meeting or, if later, within 10 days after the first public announcement of the date of such annual meeting. If a special meeting of shareholders of the Company is called in accordance with Section 2.04 for any purpose other than electing Directors to the Board of Directors or if a regular meeting other than an annual meeting is held, for a shareholder's notice of any such business to be timely it must be delivered to the Secretary of the Company, or mailed and received at the principal executive office of the Company, not less than 90 days before such special meeting or such regular meeting, or, if later, within 10 days after the first public announcement of the date of such special meeting or such regular meeting. Except to the extent otherwise required by law, the adjournment of a regular or special meeting of shareholders shall not commence a new time period for the giving of a shareholder's notice as required above. A shareholder's notice to the Secretary shall set forth as to each matter the shareholder proposes to bring before the regular or special meeting (w) a brief description of the business desired to be brought before the meeting and the reasons for conducting such business at the meeting, (x) the name and address, as they appear on the Company's books, of the shareholder proposing such business, (y) the class and number of shares of the Company which are beneficially owned by the shareholder and (z) any material interest of the shareholder in such business. Notwithstanding anything in these Bylaws to the contrary, no business shall be conducted at any regular or special meeting except in accordance with the procedures set forth in this Section 2.14-b and, as an additional limitation, the business transacted at any special meeting shall be limited to the purposes stated in the notice of the special meeting. The Chairman of the meeting shall, if the facts warrant, determine that business was not properly brought before the meeting in accordance with the provisions of this Section 2.14-b and, if the Chairman should so determine, the Chairman shall so declare to the meeting and any such business not properly brought before the meeting shall not be transacted.

Section 2.14-c. Public Announcement. For purposes of this Section 2.14, "public announcement" means disclosure (i) when made in a press release reported by the Dow Jones News Service, Associated Press, or comparable national news service, (ii) when filed in a document publicly filed by the Company with the Securities and Exchange Commission pursuant to Section 13, 14 or 15 (d) of the Securities Exchange Act of 1934, as amended, or (iii) when mailed as the notice of the meeting pursuant to Section 2.05 of these Bylaws.

ARTICLE III: DIRECTORS

Section 3.01. General Powers. The business of the Company shall be managed by its Board of Directors, which may exercise all such powers of the Company and do all such lawful acts and things as are not by statute or by the Articles of Incorporation or by these Bylaws directed or required to be exercised or done by the shareholders.

Section 3.02. Number; Qualifications. Until the first meeting of the shareholders, the number of Directors which shall constitute the whole Board shall be the number named in the Articles of Incorporation or otherwise appointed by the Incorporator of the Company prior to the issuance of shares of the Company. Thereafter, the number of Directors that shall constitute the whole Board shall be at least one (1). In the absence of a resolution of the shareholders or the Directors, the number of Directors shall be the number last fixed by the shareholders or the Directors; provided, however, that the Board of Directors may not decrease the number of Directors. Directors need not be shareholders. Each of the Directors shall hold office until the next succeeding annual meeting of shareholders and until his successor shall have been duly elected and qualified, or until his earlier resignation or removal from office as hereinafter provided.

Section 3.03. Vacancies. In the event that any member of the Board of Directors shall resign, die, be removed from office, become disqualified, or refuse to act during his term of office, or any vacancy or vacancies in the Board of Directors shall occur for any other reason, such vacancy or vacancies shall be filled by a majority vote of the remaining members of the Board of Directors, although less than a quorum, the provisions of Section 3.04-e hereof notwithstanding. However, in the event that there are no duly elected and qualified Directors remaining in office, then the shareholders shall elect by majority vote a new Director or new Directors to fill such vacancy or vacancies. The voting by the shareholders to fill such vacancy or vacancies shall be conducted as provided in the Articles of Incorporation and these Bylaws. When one or more Directors shall give notice of his or their resignation to the Board, effective at a future date, the Board shall have power to fill such vacancy or vacancies to take effect when such resignation or resignations shall become effective. Each Director elected to hold office as provided in this Section 3.03 shall hold office until the next succeeding annual meeting of the shareholders and until his successor shall have been elected and qualified, or until his earlier resignation or removal from office as hereinafter provided.

Section 3.04. Meetings.

Section 3.04-a. Place of Meetings. The Board of Directors of the Company may hold meetings, both regular and special, either within or without the State of Minnesota.

Section 3.04-b. Regular Meetings. As soon as practicable after each annual election of Directors, the Board of Directors shall meet at the registered office of the Company, or at such other place within or without the State of Minnesota as may be designated by the Board of Directors, for the purpose of electing the officers of the Company and for the transaction of such other business as shall come before the meeting. Other regular meetings of the Board of Directors may be held without notice at such time and place within or without the State of Minnesota as shall from time to time be determined by resolution of the Board of Directors.

Section 3.04-c. Special Meetings. Special meetings of the Board of Directors may be called by the Chief Executive Officer or Secretary or by one or more Directors and shall be held at such time and place as shall be designated in the notice of such meeting.

Section 3.04-d. Notice. Notice of a special meeting shall be given to each Director at least 24 hours before the time of the meeting, or at the earliest time possible thereafter, but prior to such meeting, if it is impractical to give such notice 24 hours in advance. Notice may be given by any means calculated to apprise the Directors of the special meeting. Notice by mail shall be deemed to be given at the time when the same shall be mailed. Whenever any provision of law, the Articles of Incorporation, or the Bylaws require notice to be given, any Director may, in writing, either before or after the meeting, waive notice thereof. Without notice, any Director, by his attendance at and participation in the action taken at any meeting, shall be deemed to have waived notice thereof.

Section 3.04-e. Quorum; Voting Requirements; Adjournment. A majority of the Board of Directors then in office shall be necessary to constitute a quorum for the transaction of business, and the act of a majority of the Directors present at a meeting at which a quorum is present shall be the act of the Board of Directors, except as may be otherwise specifically provided by statute or by the Articles of Incorporation or these Bylaws.

If a quorum shall not be present at any meeting of the Board of Directors, the Directors present thereat may adjourn the meeting to another time or place, and no notice as to such adjourned meeting need be given other than by announcement at the meeting at which such adjournment is taken. If a quorum is present at the call of a meeting, the Directors may continue to transact business until adjournment notwithstanding the withdrawal of enough Directors to leave less than a quorum.

Section 3.04-f. Organization of Meetings. At all meetings of the Board of Directors the Chairman of the Board, if appointed, or in his absence, the Chief Executive Officer, or in his absence, any Director appointed by the Chief Executive Officer, shall preside, and the Secretary, or in his absence, any person appointed by the Chief Executive Officer, shall act as Secretary.

Section 3.04-g. Action in Writing. Except as may be otherwise required by statute or the Articles of Incorporation, any action required or permitted to be taken at any meeting of the Board of Directors of the Company may be taken without a meeting, without prior notice, and without a vote, if a consent in writing, setting forth the action so taken, shall be signed by the number of Directors that would be necessary to authorize or take such action at a meeting at which all Directors entitled to vote thereon were present and voted. Prompt notice of the taking of the corporate action without a meeting by less than unanimous written consent shall be given to those Directors who have not consented in writing.

Section 3.04-h. Absent Directors. A Director may give advance written consent or opposition to a proposal to be acted on at a meeting of the Board of Directors. Such advance written consent or opposition shall be ineffective unless the writing is delivered to the Chief Executive Officer or Secretary of the Company prior to the meeting at which such proposal is to be considered. If the Director is not present at the meeting, consent or opposition to a proposal does not constitute presence for purposes of determining the existence of a quorum, but such consent or opposition shall be counted as a vote in favor of or against the proposal and shall be entered in the minutes or other record of action at the meeting, if the proposal acted on at the

meeting is substantially the same or has substantially the same effect as the proposal to which the Director has consented or objected.

Section 3.05. Committees.

Section 3.05-a. Committees. The Board of Directors may, by resolution approved by the affirmative vote of the majority of its members, establish one or more committees, including an executive committee, which shall have the authority of the Board of Directors in the management of the business and affairs of the Company to the extent provided in the resolution, as amended from time to time. Any such committee shall consist of one or more natural persons, who need not be Directors, appointed by the affirmative vote of the majority of the Directors present.

Section 3.05-b. Limitations on Authority. No committees of the Company shall have authority as to any of the following matters:

(a) The submission to shareholders of any action as to which shareholders' authorization is required by law;

(b) The filling of vacancies in the Board of Directors or on any committee;

(c) The fixing of compensation of any Director for serving on the Board or on any committee;

(d) The amendment or repeal of these Bylaws or the adoption of new Bylaws;

(e) The amendment or repeal of any resolution of the Board, which by its terms shall not be so amendable or repealable.

Section 3.05-c. Minutes of Committee Meetings. The committees shall keep regular minutes of their proceedings and report the same to the Board when required.

Section 3.06. Telephone Conference Meetings. Any Director or any member of a duly constituted committee of the Board of Directors may participate in any meeting of the Board of Directors or of any duly constituted committee thereof by means of a conference telephone or other comparable communication technique whereby all persons participating in such a meeting can hear and communicate with each other. For the purpose of establishing a quorum and taking any action at such a meeting, the members participating in such a meeting pursuant to this Section 3.06 shall be deemed present in person at such meeting.

Section 3.07. Compensation. Directors may be paid their expenses, if any, of attendance at each meeting of the Board of Directors. Directors who are not also salaried officers may be paid a fixed sum for attendance at each meeting of the Board of Directors. Nothing herein contained shall preclude any Director from serving the Company in any other capacity and receiving compensation therefor. Members of special or standing committees may be allowed like compensation for attending committee meetings.

Section 3.08. Limitation of Directors' Liabilities. A Director shall not be liable to the Company or its shareholders for dividends illegally declared, distributions illegally made to shareholders, or any other actions taken in good faith reliance upon financial statements of the Company represented to him to be correct by the Chief Executive Officer of the Company or the officer having charge of its books of account or certified by an independent or certified public accountant to fairly reflect the financial condition of the Company; nor shall he be liable if in good faith in determining the amount available for dividends or distribution the Board values the assets in a manner allowable under the applicable law.

Section 3.09. Resignation and Removal. Any Director may resign at any time by giving written notice to the Secretary. Such resignation shall take effect on the date of the Secretary's receipt of such notice or at such later date as specified therein. Except as otherwise provided by law, the entire Board of Directors or any individual Director may be removed from office with or without cause by a vote of the shareholders holding a majority of the shares entitled to vote at an election of the Directors.

ARTICLE IV: OFFICERS

Section 4.01. Selection and Qualification.

Section 4.01-a. Required Officers. The Company shall have one or more natural persons exercising the functions of the offices, however designated, of Chief Executive Officer and Chief Financial Officer.

Section 4.01-b. Additional Officers. In addition to appointing a Chief Executive Officer and a Chief Financial Officer, the Board of Directors may appoint, in a resolution approved by the affirmative vote of the majority of the Directors present, any other officers, assistant officers or agents the Board of Directors deems necessary or appropriate for the operation and management of the Company, each of whom shall have the powers, rights, duties, responsibilities and terms in office determined by the Board of Directors from time to time.

Section 4.01-c. Election. At its first regular meeting after the annual meeting of the shareholders each year, the Board of Directors shall appoint a Chief Executive Officer and a Chief Financial Officer and such other officers as the Board of Directors deems necessary.

Section 4.02. Salaries. The salaries of all officers of the Company shall be fixed by the Board of Directors.

Section 4.03. Term of Office. The officers of the Company shall hold office until their successors are chosen and qualified. Any officer elected or appointed by the Board of Directors may be removed at any time with or without cause by the affirmative vote of a majority of the Board of Directors. Any officer may resign at any time by giving written notice to the Chief Executive Officer or the Secretary of the Company. Any vacancy occurring in any office of the Company by death, resignation, removal, or otherwise shall be filled by the Board of Directors. However, in the event that there should be no duly elected and qualified Directors remaining in

office, then the shareholders shall elect a new Director or new Directors to fill such vacancy or vacancies.

Section 4.04. Chairman of the Board of Directors. If the Board shall appoint a Chairman of the Board of Directors, such Chairman shall preside at all meetings of the Board of Directors and of the shareholders and shall perform such other duties as he may be directed to perform by the Board of Directors.

Section 4.05. Chief Executive Officer. The Chief Executive Officer shall have general supervision over the affairs of the Company and over the other officers. Unless the Board has appointed a Chairman of the Board of Directors, the Chief Executive Officer shall preside at all meetings of the Board of Directors and of the shareholders. The Chief Executive Officer shall, subject to approval of or review by the Board of Directors, appoint and discharge employees and agents of the Company and fix their compensation and make and sign contracts and agreements in the name and on behalf of the Company. The Chief Executive Officer shall put into operation such business policies of the Company as shall be decided upon by the Board. The Chief Executive Officer shall perform such other duties as may be prescribed by the Board of Directors or the Minnesota Business Corporation Act.

Section 4.06. Vice President. Unless otherwise determined by the Board of Directors, the Vice Presidents shall, in the absence or disability of the Chief Executive Officer, perform the duties and exercise the powers of the Chief Executive Officer. They shall also generally assist the Chief Executive Officer and exercise such other powers and perform such other duties as are delegated to them by the Chief Executive Officer as the Board of Directors shall prescribe.

Section 4.07. Secretary. The Secretary shall attend all meetings of the shareholders and of the Board of Directors and shall record all the proceedings of the meetings of the shareholders and of the Board of Directors in a book to be kept for that purpose and shall perform like duties for the standing committees when required, and shall give, or cause to be given, notice of all meetings of the shareholders and special meetings of the Board of Directors, and shall perform such other duties as may be prescribed by the Board of Directors or the Chief Executive Officer, under whose supervision he shall be.

Section 4.08. Chief Financial Officer. The Chief Financial Officer shall have the following duties in addition to any duties that might be imposed by the Board of Directors or by the Minnesota Business Corporation Act.

Section 4.08-a. Custody of Funds and Accounting. The Chief Financial Officer shall have the custody of the corporate funds and securities and shall keep full and accurate accounts of receipts and disbursements in books belonging to the Company and shall deposit all moneys and other valuable effects in the name and to the credit of the Company in such depositories as may be designated by the Board of Directors.

Section 4.08-b. Disbursements and Reports. The Chief Financial Officer shall disburse the funds of the Company as may be ordered by the Board of Directors, taking proper vouchers for such disbursements, and shall render to the Chief Executive Officer and the Board of

Directors at the regular meetings of the Board, or when the Board of Directors so requires, an account of all his transactions as Chief Financial Officer and of the financial condition of the Company.

Section 4.08-c. Bond. If required by the Board of Directors, the Chief Financial Officer shall give the Company a bond in such sum and with such surety or sureties as shall be satisfactory to the Board of Directors for the faithful performance of the duties of his office and for the restoration, upon the expiration of his term of office or his resignation, retirement, or removal from office, of all books, papers, vouchers, money, and other property of whatever kind in his possession or under his control belonging to the Company.

ARTICLE V: CERTIFICATES FOR STOCK

Section 5.01. Issuance of Shares and Fractional Shares. The Board of Directors is authorized to issue shares and fractional shares of stock of the Company up to the full amount authorized by the Articles of Incorporation in such amounts as may be determined by the Board of Directors and as permitted by law. No shares shall be allotted except in consideration of cash or other property, tangible or intangible, received or to be received under a written agreement by the Company, or services rendered or to be rendered under a written agreement to the Company, or an amount transferred from surplus to stated capital upon a share dividend. At the time of each such allotment of shares, the Board of Directors shall state by resolution its determination of the fair market value to the Company in monetary terms of any consideration other than cash for which shares are allotted. The amount of consideration to be received in cash or otherwise shall not be less than the par value of the shares so allotted nor less than the stated capital to be represented by shares without par value so allotted.

Section 5.02. Form of Certificate. Every shareholder shall be entitled to have a certificate, signed by the Chief Executive Officer, a Vice President, the Chief Financial Officer or a Treasurer or an Assistant Treasurer, or the Secretary or an Assistant Secretary, of the Company, certifying the number of shares of capital stock owned by him in the Company. If the Company shall be authorized to issue more than one class of stock or more than one series of any class, the designations, preferences, and relative, participating, optional, or other special rights of the various classes of stock or series thereof and the qualifications, limitations, or restrictions of such rights, together with a statement of the authority of the Board of Directors to determine the relative rights and preferences of subsequent classes or series, shall be set forth in full on the face or back of the certificate which the Company shall issue to represent such stock, or, in lieu thereof, such certificate shall contain a statement that the stock is, or may be, subject to certain rights, preferences, or restrictions and that a statement of the same will be furnished without charge by the Company upon request by any shareholder. Certificates representing the shares of the capital stock of the Company shall be in such form not inconsistent with law or the Articles of Incorporation or these Bylaws as shall be determined by the Board of Directors.

Section 5.03. Facsimile. Whenever any certificate is countersigned or otherwise authenticated by a transfer agent, transfer clerk, or registrar, then a facsimile of the signatures of the officers or agents of the Company may be printed or lithographed upon such certificate in lieu of the actual signatures. In case any officer or officers who shall have signed, or whose

facsimile signature shall have been used on, any such certificate or certificates shall cease to be such officer or officers of the Company, whether because of death, resignation, or otherwise, before such certificate or certificates shall have been delivered by the Company, such certificate or certificates may nevertheless be adopted by the Company and be signed and delivered as though the person or persons who signed such certificate or certificates, or whose facsimile signature or signatures shall have been used thereon, had not ceased to be the officer or officers of the Company.

Section 5.04. Lost, Stolen, or Destroyed Certificates. The Board of Directors may direct a new certificate or new certificates to be issued in place of a certificate or certificates previously issued by the Company alleged to have been lost, stolen, or destroyed, upon the making of an affidavit of the fact by the person claiming the certificate of stock to be lost, stolen, or destroyed. When authorizing such issue of a new certificate or new certificates, the Board of Directors may, in its discretion and as a condition precedent to the issuance thereof, require the owner of such lost, stolen, or destroyed certificate or certificates, or his legal representative, to advertise the same in such manner as it shall require and/or give the Company a bond in such sum as it may direct as indemnity against any claim that may be made against the Company with respect to the certificate or certificates alleged to have been lost, stolen, or destroyed.

Section 5.05. Transfer of Stock. Upon surrender to the Company or any transfer agent of the Company of a certificate for shares duly endorsed or accompanied by proper evidence of succession, assignment, or authority to transfer, it shall be the duty of the Company to issue a new certificate to the person entitled thereto, cancel the old certificate, and record the transaction upon its books; except that the Board of Directors may, by resolution duly adopted, establish conditions upon the transfer of shares of stock to be issued by the Company, and the purchasers of such shares shall be deemed to have accepted such conditions on transfer upon the receipt of the certificate representing such shares, provided that the restrictions shall be referred to on the certificates or the purchaser shall have otherwise been notified thereof.

Section 5.06. Closing of Transfer Books; Record Date. The Board of Directors may close the stock transfer books of the Company for a period not exceeding sixty (60) days preceding the date of any meeting of shareholders as provided in Section 2.13 hereof or the date for payment of any dividend as provided in Section 6.02 hereof or the date for the allotment of rights or the date when any change or conversion or exchange of capital stock shall go into effect. In lieu of closing the stock transfer books as aforesaid, the Board of Directors may fix in advance a date, not exceeding sixty (60) days preceding the date for payment of any dividend, or the date for the allotment of rights, or the date when any change or conversion or exchange of capital stock shall go into effect, as a record date for the determination of the shareholders entitled to receive payment of any such dividend, or to any such allotment of rights, or to exercise the rights in respect of any such change, conversion, or exchange of capital stock, and in such case such shareholders and only such shareholders shall be shareholders of record on the date so fixed and shall he entitled to receive payment of such dividend, or to receive such allotment of rights, or to exercise such rights, as the case may be, notwithstanding any transfer of any stock on the books of the Company after any such record date fixed as aforesaid. If the Board of Directors fails to fix such a record date the record date shall be the twentieth (20th) day preceding the date of payment or allotment.

Section 5.07. Registered Shareholders. The Company shall be entitled to recognize the exclusive right of the persons registered on its books as the owners of shares to receive dividends and to vote as such owners and shall not be bound to recognize any equitable or other claim to or interest in such share or shares on the part of any other person, whether or not it shall have express or other notice thereof, except as otherwise provided by the laws of Minnesota.

Section 5.08. Stock Options and Agreements. In addition to any stock options, plans, or agreements into which the Company may enter, any shareholder of this Company may enter into an agreement giving to any other shareholder or shareholders or any third party an option to purchase any of his stock in the Company, and such shares of stock shall thereupon be subject to such agreement and transferable only upon proof of compliance therewith; provided, however, that a copy of such agreement shall be filed with the Company and reference thereto placed upon the certificates representing said shares of stock.

ARTICLE VI: DIVIDENDS

Section 6.01. Source. Dividends upon the capital stock of the Company may be declared by the Board of Directors at any regular or special meeting pursuant to law. Dividends may be paid in cash, in property, or in shares of the capital stock, subject to the provisions of the Articles of Incorporation.

Section 6.02. Closing of Books; Record Date. The Board of Directors may fix a date not exceeding sixty (60) days preceding the date fixed for the payment of any dividend as the record date for the determination of the shareholders entitled to receive payment of the dividend and, in such case, only shareholders of record on the date so fixed shall be entitled to receive payment of such dividend notwithstanding any transfer of shares on the books of the Company after the record date. The Board of Directors may close the books of the Company against the transfer of shares during the whole or any part of such period. If the Board of Directors fails to fix such a record date, the record date shall be the twentieth (20th) day preceding the date of such payment.

Section 6.03. Reserves. Before payment of any dividend, there may be set aside out of the funds of the Company available for dividends such sum or sums as the Board of Directors from time to time, in its absolute discretion, deems proper as a reserve or reserves for meeting contingencies, or for equalizing dividends, or for repairing or maintaining any property of the Company or for such other purpose as the Board shall think conducive to the interest of the Company, and the Board may modify or abolish any such reserve in the manner in which it was created.

Section 6.04. Determining Fair Market Value. The Board of Directors in computing the fair market value of the assets of the Company to determine whether the Company may pay a dividend or purchase its shares shall not include unrealized appreciation of assets, except that readily marketable securities of other issuers may be valued at not more than market value.

ARTICLE VII: CHECKS

Section 7.01. Checks. All checks or demands for money or notes of the Company shall be signed by such officer or officers or such other person or persons as the Board of Directors may from time to time designate.

ARTICLE VIII: CORPORATE SEAL

Section 8.01. Corporate Seal. The Company shall have no corporate seal.

ARTICLE IX: FISCAL YEAR

Section 9.01. Fiscal Year. The fiscal year of the Company shall be fixed by resolution of the Board of Directors.

ARTICLE X: AMENDMENTS

Section 10.01. Amendments. These Bylaws may be altered or repealed at any regular meeting of the shareholders or any special meeting of the shareholders if notice of such alteration or repeal shall be contained in the notice of such special meeting. These Bylaws may be altered or amended by action of the Board of Directors at any regular or special meeting, provided that such alterations and/or amendments shall be subject to the power of the holders of a majority of the outstanding stock to change or repeal such Bylaws, and, provided further, that the Board of Directors shall not make, alter, or repeal any Bylaws fixing a quorum for meetings of shareholders, prescribing procedures for removing Directors or filling vacancies on the Board of Directors, or fixing the number of Directors or their classifications, qualifications, or terms of office, except that the Board of Directors may adopt or amend a Bylaw to increase the number of Directors.

ARTICLE XI: BOOKS AND RECORDS

Section 11.01. Books and Records. The Board of Directors of the Company shall cause to be kept:

(a) a share register not more than one year old, giving the names and addresses of the shareholders, the number and classes held by each, and the dates on which the certificates therefor were issued;

(b) records of all proceedings of shareholders and Directors; and

(c) such other records and books of account as shall be necessary and appropriate to the conduct of the corporate business.

Section 11.02. Documents Kept at Principal Executive or Registered Office. The Board of Directors shall cause to be kept at the principal executive or registered office of the Company originals or copies of:

(a) records of all proceedings of shareholders and Directors for the past three (3) years;

(b) Articles and Bylaws of the Company and all amendments thereto;

(c) reports made to any or all shareholders within the immediately preceding three (3) years;

(d) a statement of the names and usual business addresses of the Directors and principal officers of the Company;

(e) voting trust agreements;

(f) shareholder control agreements;

(g) financial statements as described in Section 11.03 hereof.

Section 11.03. Financial Statements.

Section 11.03-a. Required Financial Statements. The financial statements required to be kept by the Board of Directors at the principal executive or registered office of the Company pursuant to Section 11.02(g) hereof are as follows:

(1) Annual Financial Statements. The Company shall keep annual financial statements for the Company, including at least a balance sheet as of the end of, and a statement of income for, each fiscal year.

(2) Interim Financial Statements. The Company shall keep financial statements for the most recent interim period prepared in the course of the operations of the Company for distribution to the shareholders or to a governmental agency as a matter of public record.

Section 11.03-b. Preparation of Annual Financial Statements. The annual financial statements required by Section 11.03-a(l) hereof shall be prepared on the basis of accounting methods reasonable in the circumstances and may be consolidated statements of the Company and one or more of its subsidiaries. In the case of statements audited by a public accountant, each copy shall be accompanied by a report setting forth the opinion of the accountant on the statements. In other cases, each copy shall be accompanied by a statement of the Chief Financial Officer of the Company stating the reasonable belief of such person that the financial statements were prepared in accordance with accounting methods reasonable in the circumstances, describing the basis of presentation, and describing any respects in which the financial statements were not prepared on a basis consistent with those prepared for the previous year.

Section 11.04. Computerized Records. The records maintained by the Company, including its share register, financial records, and minute books, may utilize any information

storage technique, including, for example, punched holes, printed or magnetized spots or micro-images, even though that makes them illegible visually, if the records can be converted, by machine and within a reasonable time, into a form that is legible visually and whose contents are assembled by related subject matter to permit convenient use by persons in the normal course of business. The Company shall convert any such records to legible form upon the request of a person entitled to inspect them under Section 12.01 hereof, and the expense of the conversion shall be borne by the person who bears the expense of copying pursuant to Section 12.01.

ARTICLE XII: INSPECTION OF BOOKS

Section 12.01. Examination and Copying by Shareholders. Every shareholder of the Company and every holder of a voting trust certificate shall have a right to examine, in person or by agent or attorney, at any reasonable time or times, and at the place or places where usually kept, the share register and all documents identified in Section 11.02 hereof. Other documents may be examined and copied (at the expense of the examining party) only upon the showing of a proper purpose. The expense of copying all documents identified in Section 11.02 hereof shall be borne by the Company. The Company shall bear the expense of copying the share register only if the shareholder shows a proper purpose.

Section 12.02. Information to Shareholders. Upon the written request by a shareholder of the Company, the Board of Directors shall furnish to him the most recent annual financial statement of the Company pursuant to Section 11.03-a(l) hereof.

ARTICLE XIII: LOANS AND ADVANCES

Section 13.01. Loans, Guarantees, and Suretyship. The Company may lend money to, guarantee an obligation of, become a surety for, or otherwise financially assist a person if the transaction, or a class of transactions to which the transaction belongs, is approved by the affirmative vote of a majority of the Directors present at a lawfully convened meeting and such action (a) is in the usual and regular course of business of the Company, (b) is with, or for the benefit of, a related corporation or organization in which the Company has a financial interest, an organization with which the Company has a business relationship, or an organization to which the Company has the power to make donations, (c) is with, or for the benefit of, an officer or other employee of the Company or a subsidiary, including an officer or employee who is a Director of the Company or a subsidiary, and may reasonably be expected, in the judgment of the Board of Directors, to benefit the Company, or (d) has been approved by the affirmative vote of the holders of two-thirds (2/3) of the outstanding shares of the Company. The loan, guarantee, or other assistance may be with or without interest and may be unsecured or may be secured in any manner that a majority of the Board of Directors approves, including, without limitation, a pledge of or other security interest in shares of the Company.

Section 13.02. Advances to Officers, Directors, and Employees. The Company may, without a vote of the Directors, advance money to its Directors, officers, or employees to cover expenses that can reasonably be anticipated to be incurred by them in the performance of their duties and for which they would be entitled to reimbursement in the absence of an advance.

ARTICLE XIV: INDEMNIFICATION

Section 14.01. Indemnification. The Company shall indemnify any person made or threatened to be made a party to a proceeding by reason of such person's being or having been a director, officer, member of a committee, employee, or agent of the Company against judgments, penalties, fines, including, without limitation, excise taxes assessed against the person with respect to an employee benefit plan, settlements, and reasonable expenses, including attorneys' fees and disbursements, incurred by the person in connection with the proceeding. The indemnification provided hereby and the eligibility of any person therefor shall be subject to the applicable provisions of the Minnesota Business Corporation Act, as in effect from time to time.

ARTICLE XV: DEFINITIONS AND USAGE

Section 15.01. Singular, Plural; Masculine, Feminine, and Neuter. Whenever the context of these Bylaws requires, the plural shall be read to include the singular, and vice versa; and words of the masculine gender shall refer to the feminine gender, and vice versa; and words of the neuter gender shall refer to any gender.

KNOW ALL MEN BY THESE PRESENTS, that the undersigned, Secretary of this Company, does hereby certify that the foregoing Bylaws constituting pages numbered one through seventeen were duly adopted as the amended and restated Bylaws of this Company in accordance with law.

Secretary

Dated: February 17, 1999

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THIS SCHEDULE CONTAINS SUMMARY FINANCIAL INFORMATION EXTRACTED FROM THE COMPANY'S FINANCIAL STATEMENTS FOR THE FISCAL YEAR ENDED MARCH 31, 1999, AND IS QUALIFIED IN ITS ENTIRETY BY REFERENCE TO SUCH FINANCIAL STATEMENTS.
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