

PIONEER MUNICIPAL HIGH INCOME ADVANTAGE TRUST

Form N-Q

August 29, 2006

OMB APPROVAL

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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM N-Q

CERTIFIED SHAREHOLDER REPORT OF REGISTERED
MANAGEMENT INVESTMENT COMPANIES

Investment Company Act file number 811-21409

Pioneer Municipal High Income Advantage Trust
(Exact name of registrant as specified in charter)

60 State Street, Boston, MA 02109
(Address of principal executive offices) (ZIP code)

Dorothy E. Bourassa, Pioneer Investment Management, Inc.,
60 State Street, Boston, MA 02109
(Name and address of agent for service)

Registrant's telephone number, including area code: (617) 742-7825

Date of fiscal year end: March 31

Date of reporting period: June 30, 2006

Form N-Q is to be used by management investment companies, other than small business investment companies registered on Form N-5 (239.24 and 274.5 of this chapter), to file reports with the Commission, not later than 60 days after close of the first and third fiscal quarters, pursuant to Rule 30b1-5 under the Investment Company Act of 1940 (17 CFR 270.30b-5). The Commission may use the information provided on Form N-Q in its regulatory, disclosure review, inspection, and policymaking roles.

A registrant is required to disclose the information specified by Form N-Q, and the Commission will make this information public. A registrant is not required to respond to the collection of information contained in Form N-Q unless the Form displays a currently valid Office of Management and Budget ("OMB") control number. Please direct comments concerning the accuracy of the information collection burden estimate and any suggestions for reducing the burden to Secretary, Securities and Exchange Commission, 450 Fifth Street, NW, Washington, DC 20549-0609. The OMB has reviewed this collection of information under the clearance requirements of 44 U.S.C. ss. 3507.

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ITEM 1. Schedule of Investments.

Pioneer Municipal High Income Advantage Trust

SCHEDULE OF INVESTMENTS 6/30/06 (unaudited)

| Principal Amount (\$) | | Value |
|--------------------------|--|------------|
| | TAX-EXEMPT OBLIGATIONS - 141.7% of Net Assets | |
| | Alaska - 1.2% | |
| 3,875,000 | (a)Alaska State Housing Finance Corp., RIB, 10.069%, \$ | 4,370,884 |
| | Arizona - 5.6% | |
| 5,000,000 | Casa Grande Industrial Development Authority, Hos \$ | 5,489,750 |
| 3,130,000 | Coconino County Arizona Pollution Control Corp. R | |
| 3,074,411 | | |
| 1,615,000 | Coconino County Arizona Pollution Control Corp. R | 1,638,660 |
| 3,140,000 | (a)Downtown Phoenix Hotel Corp., RIB, 6.806%, 7/1/40 | 3,169,202 |
| 1,000,000 | Pima County Industrial Development Authority, 6.3 | 1,023,820 |
| 1,570,000 | Pima County Industrial Development Authority, 6.7 | 1,628,467 |
| 1,000,000 | +Pima County Industrial Development Authority, 7.5 | |
| 1,196,770 | | |
| 2,000,000 | San Luis Facility Development Corp., 7.25%, 5/1/2 | 2,004,620 |
| | \$ | 19,225,700 |
| | California - 6.6% | |
| 2,680,000 | Golden State Tobacco Securitization Corp., 6.75%, \$ | 2,999,536 |
| 9,520,000 | (a)University of California, RIB, 6.972%, 5/15/38 (1 | 10,045,694 |
| 9,455,000 | Valley Health System Hospital Revenue, 6.875%, 5 | 9,466,724 |
| | \$ | 22,511,954 |
| | Colorado - 1.8% | |
| 2,850,000 | Denver Health & Hospital Authority Healthcare Rev \$ | 2,973,946 |
| 3,650,000 | Northwest Parkway Public Highway Authority, 7.125 | |
| 3,378,951 | | |
| | \$ | 6,352,897 |
| | Connecticut - 0.7% | |
| 3,000,000 | Bridgeport Connecticut Senior Living Facilities R \$ | 2,516,790 |
| | District of Columbia - 2.1% | |
| 2,700,000 | District of Columbia Tobacco Settlement Financing \$ | 3,035,340 |
| 4,000,000 | District of Columbia Tobacco Settlement Financing | 4,339,720 |
| | \$ | 7,375,060 |
| | Florida - 5.8% | |
| 1,000,000 | Greater Orlando Aviation Authority, 6.5%, 11/15/3 \$ | 1,039,670 |
| 4,500,000 | Hillsborough County Florida Industrial Development Authority | |
| Pollution | | |
| | Control Revenue, 5.5%, 10/1/23 | 4,603,185 |
| 2,000,000 | Hillsborough County Florida Industrial Development Authority | |
| Pollution | | |
| | Control Revenue, 6.75%, 7/1/29 | 2,025,740 |
| 500,000 | Miami Beach Health Facilities Authority, 5.375%, | 493,245 |
| 1,500,000 | Miami Beach Health Facilities Authority, 6.7%, 11 | 1,633,905 |
| 10,000,000 | Miami-Dade County Aviation Revenue, 5.0%, 10/1/37 | 10,101,000 |
| | \$ | 19,896,745 |
| | Georgia - 2.7% | |
| 4,000,000 | (a)Atlanta Georgia Water and Wastewater Revenue, RIB \$ | 4,088,040 |
| 2,500,000 | Brunswick & Glynn County Development Authority Re | 2,449,525 |
| 1,065,000 | Effingham County Industrial Development Authority | |
| 1,117,473 | | |
| 1,650,000 | Savannah Georgia Economic Development Authority R | 1,712,964 |
| | \$ | 9,368,002 |

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| | | | |
|------------|---|----|------------|
| | Guam - 1.6% | | |
| 5,000,000 | Northern Mariana Islands, 6.75%, 10/1/33 | \$ | 5,531,750 |
| | Idaho - 2.4% | | |
| 2,000,000 | Power County Industrial Development Corp., 6.45%, | \$ | 2,126,880 |
| 5,920,000 | Power County Pollution Control Revenue, 5.625% 10 | | 6,032,835 |
| | | \$ | 8,159,715 |
| | Illinois - 4.3% | | |
| 4,000,000 | Centerpoint Intermodal Center, 8.0%, 6/15/23 (144 | \$ | 4,013,400 |
| 1,000,000 | Illinois Finance Authority Revenue, 6.0%, 11/15/2 | | |
| 1,002,210 | | | |
| 3,000,000 | Illinois Finance Authority Revenue, 6.0%, 11/15/3 | | 2,972,400 |
| 1,645,000 | Illinois Health Facilities Authority Revenue, 5.5 | | |
| 1,515,094 | | | |
| 1,400,000 | Illinois Health Facilities Authority Revenue, 6.7 | | 1,399,944 |
| 2,400,000 | Illinois Health Facilities Authority Revenue, 6.7 | | 2,370,480 |
| 1,500,000 | Illinois Health Facilities Authority Revenue, 6.9 | | 1,627,290 |
| | | \$ | 14,900,818 |
| | Indiana - 5.5% | | |
| 1,200,000 | Indiana State Development Finance Authority Pollu | \$ | 1,226,652 |
| 10,000,000 | Indiana State Development Finance Authority Reven | | 10,297,700 |
| 5,000,000 | Jasper County Industrial Economic Development Rev | | 4,923,700 |
| 2,315,000 | Vincennes Industrial Economic Development Revenue | | 2,301,365 |
| | | \$ | 18,749,417 |
| | Kentucky - 1.4% | | |
| 500,000 | Kentucky Economic Development Finance Authority H | \$ | 506,240 |
| 4,400,000 | Kentucky Economic Development Finance Authority H | | 4,431,152 |
| | | \$ | 4,937,392 |
| | Louisiana - 3.1% | | |
| 750,000 | Opelousas Louisiana General Hospital Authority Re | \$ | 750,555 |
| 9,415,000 | Tobacco Settlement Financing Corp., 5.875%, 5/15/ | | 9,847,808 |
| | | \$ | 10,598,363 |
| | Maryland - 0.4% | | |
| 1,500,000 | Maryland Health & Higher Educational Facilities A | \$ | 1,509,210 |
| | Massachusetts - 7.6% | | |
| 1,000,000 | Lynn Massachusetts Water & Sewer Commission Gener | \$ | 1,014,820 |
| 5,000,000 | Massachusetts Bay Transportation Authority Revenu | | 5,219,250 |
| 2,195,000 | Massachusetts Health & Educational Facilities Aut | | 2,127,460 |
| 1,000,000 | Massachusetts Health & Educational Facilities Aut | | 1,042,410 |
| 3,520,000 | (aMassachusetts State College Building Authority Pr | | 3,656,330 |
| 1,740,000 | Massachusetts State Development Finance Agency, 5 | | 1,599,391 |
| 2,920,000 | Massachusetts State Development Finance Agency, 6 | | 2,947,390 |
| 4,710,000 | Massachusetts State Development Finance Agency, 7 | | 4,874,238 |
| 3,475,000 | (aMassachusetts State Housing Finance Agency, RIB, | | 3,475,730 |
| | | \$ | 25,957,019 |
| | Michigan - 4.4% | | |
| 3,000,000 | +Delta County Michigan Economic Development Corp., | \$ | 3,340,410 |
| 3,000,000 | Macomb County Hospital Finance Authority Revenue, | | 3,152,520 |
| 4,130,000 | Michigan State Hospital Finance Authority Revenue | | 3,948,858 |
| 1,000,000 | Michigan State Strategic Fund Solid Waste Disposa | | 1,026,450 |
| 3,000,000 | (bWayne Charter County Michigan Special Airport Fac | | 1,653,330 |
| 3,405,000 | (bWayne Charter County Michigan Special Airport Fac | | 1,895,325 |
| | | \$ | 15,016,893 |
| | Minnesota - 1.0% | | |
| 4,800,000 | (bMinneapolis/St. Paul Metropolitan Airports, 7.0%, | \$ | 3,368,256 |
| | Missouri - 1.0% | | |
| 1,500,000 | St. Louis Industrial Development Authority Revenu | \$ | 1,445,280 |
| 2,000,000 | St. Louis Industrial Development Authority Revenu | | 1,927,340 |
| | | \$ | 3,372,620 |

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| | | | |
|------------|---|----|------------|
| | Montana - 0.3% | | |
| 1,000,000 | Two Rivers Authority, Inc., Project Revenue, 7.37 % | \$ | 965,860 |
| | Nevada - 2.4% | | |
| 2,425,000 | Clark County Industrial Development Revenue, 5.5% | \$ | 2,366,727 |
| 2,500,000 | Clark County Industrial Development Revenue, 5.9% | | 2,500,350 |
| 1,600,000 | Nevada State Department of Business & Industry, 7 | | 1,659,104 |
| 1,000,000 | Nevada State Department of Business & Industry, 7 | | 1,040,640 |
| 500,000 | Nevada State Department of Business & Industry, 7 | | 518,265 |
| | | \$ | 8,085,086 |
| | New Hampshire - 1.5% | | |
| 1,000,000 | New Hampshire Health & Educational Facilities Aut | \$ | 1,020,510 |
| 1,125,000 | New Hampshire Health & Educational Facilities Aut | | 1,143,067 |
| 3,000,000 | +New Hampshire Higher Educational & Health Facilit | | 3,145,020 |
| | | \$ | 5,308,597 |
| | New Jersey - 9.0% | | |
| 13,000,000 | New Jersey Economic Development Authority Revenue | \$ | 13,298,220 |
| 2,500,000 | New Jersey Health Care Facilities Financing Autho | | 2,537,850 |
| 1,420,000 | New Jersey Health Care Facilities Financing Autho | | 1,421,789 |
| 2,495,000 | (aNew Jersey State Turnpike Authority, RIB, 8.581%, | | 3,385,840 |
| 1,000,000 | Tobacco Settlement Financing Corp., 6.25%, 6/1/43 | | 1,078,370 |
| 3,250,000 | Tobacco Settlement Financing Corp., 6.75%, 6/1/39 | | 3,627,325 |
| 5,000,000 | Tobacco Settlement Financing Corp., 7.0%, 6/1/41 | | 5,669,200 |
| | | \$ | 31,018,594 |
| | New York - 11.0% | | |
| 3,000,000 | Dutchess County Industrial Development Agency Rev | \$ | 3,244,650 |
| 5,000,000 | Nassau County New York Industrial Development Age | | 5,063,400 |
| 6,980,000 | New York City Industrial Development Agency, 5.25 | | 6,570,623 |
| 2,000,000 | New York City Industrial Development Agency, 5.37 | | 2,044,620 |
| 2,000,000 | New York City Industrial Development Agency, 6.9% | | 2,000,640 |
| 3,950,000 | New York City Industrial Development Agency, 7.62 | | 4,438,971 |
| 2,700,000 | New York City Industrial Development Agency, 7.8% | | 2,764,422 |
| 5,000,000 | New York State Environmental Facilities Corp., 5. | | 5,091,000 |
| 4,500,000 | Suffolk County New York Industrial Development Ag | | 4,458,420 |
| 2,000,000 | Yonkers Industrial Development Agency Civic Facil | | 1,981,880 |
| | | \$ | 37,658,626 |
| | North Carolina - 5.5% | | |
| 11,350,000 | Charlotte North Carolina Special Facilities Reven | \$ | 11,137,074 |
| 7,140,000 | Charlotte North Carolina Special Facilities Reven | | 7,642,585 |
| | | \$ | 18,779,659 |
| | Ohio - 2.7% | | |
| 3,900,000 | Belmont County Health System Revenue, 5.7%, 1/1/1 | \$ | 3,786,783 |
| 1,000,000 | Belmont County Health System Revenue, 5.8%, 1/1/1 | | 950,890 |
| 5,000,000 | Cleveland Airport Special Revenue, 5.375%, 9/15/2 | | 4,576,950 |
| | | \$ | 9,314,623 |
| | Oklahoma - 1.1% | | |
| 2,345,000 | Jackson County Memorial Hospital Authority Revenu | \$ | 2,357,171 |
| 1,500,000 | Tulsa Municipal Airport Transportation Revenue, 7 | | 1,499,745 |
| | | \$ | 3,856,916 |
| | Oregon - 4.2% | | |
| 5,900,000 | Klamath Falls Electric Revenue, 5.75%, 1/1/13 (14 | \$ | 5,252,062 |
| 8,000,000 | Klamath Falls Electric Revenue, 6.0%, 1/1/25 (144 | | 6,510,080 |
| 2,500,000 | Western Generation Agency Cogeneration Project Re | | 2,508,425 |
| | | \$ | 14,270,567 |
| | Pennsylvania - 6.7% | | |
| 3,000,000 | Allegheny County Hospital Development Authority R | \$ | 3,551,070 |
| 500,000 | Allegheny County Hospital Development Authority R | | 590,805 |
| 1,000,000 | Clarion County Hospital Authority Revenue, 5.625% | | 1,004,240 |
| 3,735,000 | Columbia County Hospital Authority Revenue, 5.85% | | 3,341,966 |
| 1,250,000 | Hazleton Health Services Authority Hospital Reven | | 1,229,400 |
| 3,360,000 | Montgomery County Higher Education & Health Autho | | 3,429,888 |
| 1,430,000 | Pennsylvania Economic Development Financing Autho | | 1,370,240 |

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| | | |
|------------|---|----------------|
| 1,805,000 | Pennsylvania Economic Development Financing Autho | 1,799,874 |
| 2,330,000 | Pennsylvania Economic Development Financing Autho | 2,323,919 |
| 2,005,000 | Scranton-Lackawanna Health & Welfare Authority Re | 1,993,090 |
| 2,245,000 | Scranton-Lackawanna Health & Welfare Authority Re | 2,231,687 |
| | | \$ 22,866,179 |
| | Rhode Island - 4.0% | |
| 4,485,000 | Central Falls Rhode Island Detention Facilities R \$ | 4,919,372 |
| 8,285,000 | Tobacco Settlement Financing Corp., 6.25%, 6/1/42 | 8,680,029 |
| | | \$ 13,599,401 |
| | South Carolina - 5.8% | |
| 1,500,000 | Connector 2000 Association, Inc., Toll Road Reven \$ | 1,310,970 |
| 1,600,000 | Loris Community Hospital District, 5.625%, 1/1/29 | 1,623,776 |
| 7,140,000 | +South Carolina Jobs Economic Development Authorit | 8,090,905 |
| 860,000 | South Carolina Jobs Economic Development Authorit | 949,191 |
| 3,000,000 | South Carolina Jobs Economic Development Authorit | 3,262,620 |
| 4,400,000 | Tobacco Settlement Revenue Management, 6.375%, 5/ | 4,845,676 |
| | | \$ 20,083,138 |
| | Tennessee - 2.5% | |
| 1,000,000 | Johnson City Health & Educational Facilities Boar \$ | 1,148,320 |
| 7,000,000 | Knox County Health Educational & Housing Faciliti | 7,363,230 |
| | | \$ |
| 8,511,550 | | |
| | Texas - 18.2% | |
| 11,300,000 | Alliance Airport Authority Special Facilities Rev \$ | 11,297,966 |
| 8,650,000 | Brazos River Authority Pollution Control Revenue, | 9,664,039 |
| 13,885,000 | Dallas-Fort Worth International Airport Revenue, | 13,477,614 |
| 10,000,000 | Houston Texas Airport System Revenue, 6.75%, 7/1/ | 10,629,100 |
| 845,000 | Lubbock Health Facilities Development Corp., 6.5% | 856,255 |
| 2,000,000 | Lubbock Health Facilities Development Corp., 6.62 | 2,024,760 |
| 7,750,000 | Matagorda County Navigation District Number 1 Rev | 7,966,147 |
| 1,885,000 | Panhandle Texas Regional Housing Finance, 8.125%, | 1,593,428 |
| 5,000,000 | Tomball Hospital Authority, 6.0%, 7/1/25 | 5,143,600 |
| | | \$ 62,652,909 |
| | Virginia - 0.5% | |
| 1,555,000 | +Pocahontas Parkway Association of Virginia Toll R \$ | 1,623,871 |
| | Washington - 6.5% | |
| 10,000,000 | Port Seattle Washington Special Facilities Revenu \$ | 10,058,900 |
| 5,500,000 | (bPort Seattle Washington Special Facilities Revenu | 3,469,785 |
| 1,390,000 | Tobacco Settlement Authority Revenue, 6.5%, 6/1/2 | 1,510,624 |
| 6,960,000 | (aWashington State Economic Development Finance Aut | |
| 7,129,198 | | |
| | | \$ 22,168,507 |
| | Wisconsin - 0.6% | |
| 1,000,000 | Wisconsin State Health & Educational Facilities A \$ | 1,015,590 |
| 1,000,000 | Wisconsin State Health & Educational Facilities A | 1,009,840 |
| | | \$ 2,025,430 |
| | TOTAL TAX-EXEMPT OBLIGATIONS | |
| | (Cost \$450,612,780) | \$ 486,508,998 |
| Shares | TAX-EXEMPT MONEY MARKET MUTUAL | |
| | FUND - 0.0% of Net Assets | |
| 838 | BlackRock Provident Institutional Municipal Fund \$ | 838 |
| | TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND | |
| | (Cost \$838) | \$ 838 |
| | TOTAL INVESTMENTS IN SECURITIES - 141.7% | |
| | (Cost \$450,613,618) (c) (d) | \$ 486,509,836 |
| | OTHER ASSETS AND LIABILITIES - 2.0% | \$ 6,979,473 |

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PREFERRED SHARES AT REDEMPTION VALUE, INCLUDING
 DIVIDENDS PAYABLE - (43.7)% \$ (150,069,964)
 NET ASSETS APPLICABLE TO COMMON SHAREOWNERS - 100 \$ 343,419,345

(144A) Security is exempt from registration under Rule 144A of the Securities Act of 1933. Such securities may be resold normally to qualified institutional buyers in a transaction exempt from registration. At June 30, 2006, the value of these securities amounted to \$59,068,020, or 17.2% of total net assets applicable to common shareowners.

RIB Residual Interest Bonds.

NR Security not rated by S&P or Moody's.

+ Prerefunded bonds have been collateralized by U.S. Treasury securities which are held in escrow to pay interest and principal on the tax exempt issue and to retire the bonds in full at the earliest refunding date.

(a) The interest rate is subject to change periodically and inversely based upon prevailing market rates. The interest rate shown was the rate at June 30, 2006.

(b) Security is in default and is non-income producing.

(c) The concentration of investments by type of obligation/market sector is as follows:

| | |
|---------------------------|--------|
| Insured | 12.4% |
| General Obligation | 1.1 |
| Revenue Bonds: | |
| Health Revenue | 24.8 |
| Airport Revenue | 16.5 |
| Development Revenue | 9.0 |
| Tobacco Revenue | 9.4 |
| Pollution Control Revenue | 7.0 |
| Transportation Revenue | 6.8 |
| Facilities Revenue | 5.7 |
| Power Revenue | 2.9 |
| Education Revenue | 1.2 |
| Water Revenue | 1.1 |
| Housing Revenue | 1.1 |
| Utilities Revenue | 0.8 |
| Other | 0.2 |
| | 100.0% |

(d) At June 30, 2006, the net unrealized gain on investments based on cost for federal income tax purposes of \$447,959,186 was as follows:

Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost 50,307,358

Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value (11,756,708)
 Net unrealized gain 38,550,650

For financial reporting purposes net unrealized gain on investments was \$35,896,218 and cost of investments aggregated \$450,613,618.

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ITEM 2. CONTROLS AND PROCEDURES.

(a) Disclose the conclusions of the registrant's principal executive officer or officers and principal financial officer or officers, or persons performing similar functions, about the effectiveness of the registrant's disclosure controls and procedures (as defined in Rule 30a-3(c) under the Act (17 CFR 270.30a-3(c))) as of a date within 90 days of the filing date of the report that includes the disclosure required by this paragraph, based on their evaluation of these controls and procedures required by Rule 30a-3(b) under the Act (17 CFR 270.30a-3(b)) and Rule 13a-15(b) or 15d-15(b) under the Exchange Act (17 CFR 240.13a-15(b) or 240.15d-15(b)).

The registrant's principal executive officer and principal financial officer have concluded that the registrant's disclosure controls and procedures are effective based on their evaluation of these controls and procedures as of a date within 90 days of the filing date of this report.

(b) Disclose any change in the registrant's internal controls over financial reporting (as defined in Rule 30a-3(d) under the Act (17 CFR 270.30a-3(d))) that occurred during the registrant's last fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting.

There were no significant changes in the registrant's internal control over financial reporting that occurred during the second fiscal quarter of the period covered by this report that have materially affected, or are reasonably likely to materially affect, the registrant's internal control over financial reporting.

The registrant's principal executive officer and principal financial officer, however, voluntarily are reporting the following information:

In August of 2006 the registrant's investment adviser enhanced its internal procedures for reporting performance information required to be included in prospectuses. Those enhancements involved additional internal controls over the appropriateness of performance data generated for this purpose. Such enhancements were made following an internal review which identified prospectuses relating to certain classes of shares of a limited number of registrants where, inadvertently, performance information not reflecting the deduction of applicable sales charges was included. Those prospectuses were revised, and the revised prospectuses were distributed to shareholders.

ITEM 3. EXHIBITS.

(a) A separate certification for each principal executive officer and principal financial officer of the registrant as required by Rule 30a-2 under the Act (17 CFR 270.30a-2).

Filed herewith.

SIGNATURES

[See General Instruction F]

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Pursuant to the requirements of the Securities Exchange Act of 1934 and the Investment Company Act of 1940, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

(Registrant) Pioneer Municipal High Income Advantage Trust

By (Signature and Title)* /s/ John F. Cogan, Jr.
John F. Cogan, Jr, President

Date August 30, 2006

Pursuant to the requirements of the Securities Exchange Act of 1934 and the Investment Company Act of 1940, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

By (Signature and Title)* /s/ John F. Cogan, Jr.
John F. Cogan, Jr., President

Date August 30, 2006

By (Signature and Title)* /s/ Vincent Nave
Vincent Nave, Treasurer

Date August 30, 2006

* Print the name and title of each signing officer under his or her signature.