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PIONEER MUNICIPAL HIGH INCOME TRUST
Form N-Q
September 26, 2005

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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 811-21321

Pioneer Municipal High Income 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: April 30

Date of reporting period: July 31, 2005

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 Trust

SCHEDULE OF INVESTMENTS 7/31/05 (unaudited)

| Principal Amount | S&P/Moody's Ratings (unaudited) | |
|------------------|---------------------------------|--|
| | | TAX EXEMPT OBLIGATIONS - 126.0% of Net Assets |
| | | Alabama - 3.4% |
| 10,000,000 | AAA/Aaa | Birmingham Alabama General Obligation, 5.0%, 12/1/32 |
| 1,500,000 | BBB/NR | Camden Alabama Industrial Development Board, 6.125%, 12/1/24 |
| | | Arizona - 7.1% |
| 5,000,000 | B+/Ba1 | Apache County Industrial Development Authority, 5.85%, 3/1/28 |
| 5,000,000 | B+/Ba1 | Apache County Industrial Development Authority, 5.875%, 3/1/33 |
| 11,630,000 | CCC/Ca | Gila County Industrial Development Authority, 5.55%, 1/1/27 |
| 3,000,000 | NR/NR | Maricopa County Industrial Development Authority, 7.875%, 4/1/27 |
| 1,000,000 | NR/Baa3 | Pima County Industrial Development Authority, 7.25%, 7/1/31 |
| 500,000 | NR/Baa2 | Yavapai County Industrial Development Authority, 6.0%, 8/1/33 |
| | | California - 12.3% |
| 7,270,000 | A/A2 | California State General Obligation, 5.25%, 2/1/28 |
| 5,000,000 | A/A2 | California State General Obligation, 5.25% 4/1/34 |
| 5,150,000 | BBB/Baa3 | Golden State Tobacco Securitization Corp., 7.8%, 6/1/42 |
| 7,000,000 | BBB/Baa3 | Golden State Tobacco Securitization Corp., 7.875%, 6/1/42 |
| 4,000,000 | AAA/Aaa | Palm Desert Financing Authority Tax Allocation Revenue, 5.0%, 4/1/30 |
| 3,000,000 | AAA/Aaa | San Diego Unified School District, 5.0%, 7/1/25 |
| 2,500,000 | AAA/Aaa | University of California Revenue, 5.0%, 5/15/25 |
| 5,000,000 | B+/NR | Valley Health System Hospital Revenue, 6.5%, 5/15/25 |
| | | Connecticut - 4.1% |
| 2,000,000 | NR/NR | Bridgeport Senior Living Facility Revenue, 7.25%, 4/1/35 |
| 2,205,000 | BB/Ba1 | Connecticut State Health & Educational Facilities Authority Revenue, 5.375%, |
| 4,800,000 | BB/Ba1 | Connecticut State Health & Educational Facilities Authority Revenue, 5.5%, 7 |
| 5,000,000 | BB+/NR | Mohegan Tribe Indians Gaming Authority, 6.25%, 1/1/31 |
| | | District of Columbia - 4.0% |
| 5,000,000 | BBB/Baa3 | District of Columbia Tobacco Settlement Financing Corp., 6.5%, 5/15/33 |
| 7,325,000 | BBB/Baa3 | District of Columbia Tobacco Settlement Financing Corp., 6.75%, 5/15/40 |
| | | Florida - 2.6% |
| 2,000,000 | NR/NR | Beacon Lakes Community Development, 6.9%, 5/1/35 |
| 1,650,000 | BBB-/Baa2 | Polk County Industrial Development Revenue, 5.85%, 12/1/30 |
| 5,000,000 | NR/Baa2 | Tallahassee Health Facilities Revenue, 6.375%, 12/1/30 |
| | | Georgia - 0.8% |
| 1,325,000 | NR/NR | Brunswick & Glynn County Development Authority Revenue, 7.25%, 1/1/35 |
| 5,500,000 | C/Ca | Fulton County Development Authority Revenue, 6.95%, 11/1/12 |
| | | Idaho - 1.5% |
| 5,000,000 | BBB-/Baa3 | Power County Industrial Development Corp., 6.45%, 8/1/32 |
| | | Illinois - 4.0% |
| 1,000,000 | NR/NR | Centerpoint Intermodal Center, 8.0%, 6/15/23 (144A) |
| 3,810,000 | C/C | Chicago Illinois O'Hare International Airport, 6.45%, 5/1/18 |

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| | |
|------------------------|--|
| 1,500,000 NR/NR | Illinois Health Facilities Authority Revenue, 6.9%, 11/15/33 |
| 16,880,000 (a) AAA/Aaa | Metropolitan Pier & Exposition Authority Dedicated State Tax Revenue, 0.0%, 6/15/22 |
| | Indiana - 1.6% |
| 1,000,000 BBB+/Baa1 | Indiana State Development Finance Authority Revenue, 5.6%, 12/1/32 |
| 4,300,000 BBB-/Ba3 | Indiana State Development Finance Authority Revenue, 5.75%, 10/1/11 |
| 2,335,000 AAA/Aaa | Massachusetts Health & Educational Facilities Authority Revenue, 5.0%, 7/15/33 |
| 7,050,000 AAA/Aaa | Massachusetts Health & Educational Facilities Authority Revenue, 5.125%, 7/15/33 |
| 1,000,000 AA/Aa3 | Massachusetts Health & Educational Facilities Authority Revenue, 5.25%, 10/1/11 |
| 3,500,000 BBB/Baa3 | Massachusetts Health & Educational Facilities Authority Revenue, 6.25%, 7/15/33 |
| 5,000,000 BBB-/NR | Massachusetts Health & Educational Facilities Authority Revenue, 6.75%, 10/1/11 |
| 75,000 BB/NR | Massachusetts State Development Finance Agency, 5.25%, 10/1/18 |
| 3,055,000 AA-/Aa3 | Massachusetts State Housing Finance Agency, 5.25%, 12/1/33 |
| | Michigan - 4.4% |
| 1,500,000 BBB-/NR | John Tolfree Health System Corp., 6.0%, 9/15/23 |
| 2,000,000 BB-/Ba3 | Michigan State Hospital Finance Authority Revenue, 5.5%, 8/15/23 |
| 4,010,000 BBB-/Ba1 | Michigan State Hospital Finance Authority Revenue, 6.0%, 2/1/24 |
| 2,000,000 +NR/NR | Michigan State Hospital Finance Authority Revenue, 6.4%, 1/1/15 |
| 7,690,000 NR/NR | Wayne Charter County Michigan Special Airport Facilities Revenue, 6.75%, 12/1/33 |
| | Minnesota - 4.3% |
| 1,675,000 BB/NR | Duluth Economic Development Authority Health Care Facilities Revenue, 7.25%, 10/1/11 |
| 13,260,000 NR/NR | Minneapolis/St. Paul Metropolitan Airports, 7.0%, 4/1/25 |
| 1,430,000 BB+/NR | St. Paul Housing & Redevelopment Authority, 6.625%, 11/1/17 |
| | Mississippi - 0.9% |
| 3,000,000 BBB-/Ba1 | Mississippi Business Finance Corp. Pollution Control Revenue, 5.9%, 5/1/22 |
| | Missouri - 1.2% |
| 5,500,000 NR/B3 | St. Louis Industrial Development Authority Revenue, 7.25%, 12/15/35 |
| | Nevada - 1.4% |
| 1,000,000 BBB-/NR | Clark County Industrial Development Revenue, 5.45%, 3/1/38 |
| 1,850,000 B-/NR | Clark County Industrial Development Revenue, 5.5%, 10/1/30 |
| 2,000,000 NR/NR | Nevada State Department of Business & Industry, 7.25%, 1/1/23 |
| | New Hampshire - 0.9% |
| 3,000,000 AAA/Aaa | Manchester School Facilities Revenue, 5.125%, 6/1/28 |
| | New Jersey - 9.3% |
| 2,000,000 B/Caa2 | New Jersey Economic Development Authority Revenue, 6.25%, 9/15/19 |
| 13,350,000 B/Caa2 | New Jersey Economic Development Authority Revenue, 6.25%, 9/15/29 |
| 1,000,000 B/Caa2 | New Jersey Economic Development Authority Revenue, 6.4%, 9/15/23 |
| 6,150,000 B/Caa2 | New Jersey Economic Development Authority Revenue, 7.0%, 11/15/30 |
| 10,000,000 BBB/Baa3 | Tobacco Settlement Financing Corp., 6.75%, 6/1/39 |
| | New Mexico - 1.5% |
| 3,700,000 ++ NR/NR | New Mexico Hospital Equipment Loan Council, 6.4%, 6/1/16 |
| 1,350,000 BBB-/NR | Santa Fe Educational Facilities Revenue, 5.75%, 10/1/28 |
| | New York - 6.0% |
| 2,000,000 A/NR | New York City Industrial Development Agency, 5.375%, 6/1/23 |
| 6,225,000 CCC/Caa2 | New York City Industrial Development Agency, 6.9%, 8/1/24 |
| 5,000,000 AAA/Aaa | New York City Trust Cultural Resources Revenue, 5.125%, 7/1/31 |
| 2,000,000 NR/NR | Suffolk County Industrial Development Agency, 7.25%, 1/1/30 |
| 6,000,000 AAA/Aaa | Triborough Bridge & Tunnel Authority Revenue, 5.25%, 11/15/30 |
| | North Carolina - 1.5% |
| 4,600,000 NR/NR | Charlotte North Carolina Special Facilities Revenue, 7.75%, 2/1/28 |

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| | | |
|-----------------------|-----------|---|
| 1,980,000 | AA+/Aa1 | North Carolina Capital Facilities Financial Agency Revenue, 5.0%, 10/1/41 |
| 3,000,000 | +AAA/Aaa | Oklahoma Development Finance Authority Revenue, 5.625%, 8/15/19 |
| 8,000,000 | +AAA/Aaa | Oklahoma Development Finance Authority Revenue, 5.625%, 8/15/29 |
| 4,100,000 | B-/Caa2 | Tulsa Municipal Airport Revenue, 5.65%, 12/1/35 |
| 1,225,000 | B-/Caa2 | Tulsa Municipal Airport Revenue, 6.25%, 6/1/20 |
| 4,350,000 | B-/Caa2 | Tulsa Municipal Airport Revenue, 7.35%, 12/1/11 |
| Oregon - 4.5% | | |
| 1,000,000 | NR/NR | Klamath Falls Electric Revenue, 5.75%, 1/1/13 |
| 7,000,000 | NR/NR | Klamath Falls Electric Revenue, 6.0%, 1/1/25 |
| 7,500,000 | NR/NR | Western Generation Agency Cogeneration Project Revenue, 7.125%, 1/1/21 |
| Pennsylvania - 5.6% | | |
| 1,550,000 | NR/Baa1 | Allegheny County Hospital Development Authority Revenue, 5.125%, 5/1/25 |
| 12,300,000 | B/B1 | Allegheny County Hospital Development Authority Revenue, 9.25%, 11/15/30 |
| 1,000,000 | BB-/NR | Columbia County Hospital Authority Health Care Revenue, 5.9%, 6/1/29 |
| 1,000,000 | BBB/Baa2 | Hazleton Health Services Authority Hospital Revenue, 5.625%, 7/1/17 |
| 1,280,000 | NR/B2 | Langhorne Manor Borough Higher Education & Health Authority Revenue, 7.35% |
| 500,000 | BBB+/NR | Pennsylvania Higher Educational Facilities Authority Revenue, 5.4%, 7/15/36 |
| Rhode Island - 1.2% | | |
| 4,000,000 | NR/NR | Central Falls Detention Facilities Revenue, 7.25%, 7/15/35 |
| South Carolina - 7.8% | | |
| 4,250,000 | BBB/Baa2 | Georgetown County Environmental Improvement Revenue, 5.95%, 3/15/14 |
| 15,000,000 | AA-/Aa3 | Greenville County School District, 5.5%, 12/1/28 |
| 5,850,000 | BBB+/Baa1 | South Carolina Jobs Economic Development Authority Revenue, 6.375%, 8/1/34 |
| Tennessee - 3.7% | | |
| 7,000,000 | BBB+/Baa2 | Johnson City Health & Educational Facilities Board Hospital Revenue, 7.5%, 7/15/29 |
| 4,480,000 | NR/Baa3 | Knox County Health Educational & Housing Facilities Board Hospital Revenue, 6.25%, 8/1/22 |
| Texas - 8.7% | | |
| 7,500,000 | CCC/Caa2 | Alliance Airport Authority Special Facilities Revenue, 7.5%, 12/1/29 |
| 1,345,000 | NR/Baa3 | Bexar County Housing Finance Corp., 8.0%, 12/1/36 |
| 2,500,000 | BBB-/Ba1 | Brazos River Authority Revenue, 5.375%, 4/1/19 |
| 1,000,000 | CCC/Caa2 | Dallas-Fort Worth International Airport Revenue, 6.0%, 11/1/14 |
| 5,000,000 | CCC/Caa2 | Dallas-Fort Worth International Airport Revenue, 6.15%, 5/1/29 |
| 485,000 | C/Ca | Dallas-Fort Worth International Airport Revenue, 6.25%, 11/1/13 |
| 7,750,000 | C/Ca | Dallas-Fort Worth International Airport Revenue, 7.125%, 11/1/26 |
| 2,800,000 | C/Ca | Dallas-Fort Worth International Airport Revenue, 7.6%, 11/1/11 |
| 7,715,000 | C/Ca | Dallas-Fort Worth International Airport Revenue, 7.625%, 11/1/21 |
| 4,000,000 | NR/NR | Decatur Hospital Authority Revenue, 7.0%, 9/1/25 |
| 1,000,000 | BB/NR | Georgetown Health Facilities Development Corp., 6.25%, 8/15/29 |
| 3,750,000 | B-/Caa2 | Houston Airport System Special Facilities Revenue, 5.7%, 7/15/29 |
| 500,000 | BBB-/Baa2 | Sabine River Authority Pollution Control Revenue, 6.15%, 8/1/22 |
| Vermont - 0.5% | | |
| 1,500,000 | A-/A3 | Vermont Educational & Health Buildings Financing Agency Revenue, 6.0%, 10/1/41 |
| Virginia - 1.5% | | |
| 1,000,000 | BBB/Baa3 | Peninsula Ports Authority, 6.0%, 4/1/33 |
| 4,000,000 | BB/NR | Pocahontas Parkway Association of Virginia Toll Road Revenue, 5.5%, 8/15/28 |
| Washington - 5.6% | | |
| 4,710,000 | AAA/Aaa | Spokane Public Facilities District Hotel/Motel Tax & Sales, 5.75%, 12/1/27 |
| 7,025,000 | BBB/Baa3 | Tobacco Settlement Authority Washington, 6.625%, 6/1/32 |
| 14,315,000 | AAA/Aaa | Washington State General Obligation, 0.0%, 6/1/22 |
| 5,000,000 | BBB-/Baa3 | Sweetwater County Solid Waste Disposal Revenue, 6.9%, 9/1/24 |

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| | |
|------------------|---|
| | TOTAL TAX-EXEMPT OBLIGATIONS (Cost \$406,613,490) |
| Shares 24,928 | TAX-EXEMPT MONEY MARKET MUTUAL FUND - 0.0% of Net Assets BlackRock Provident Institutional Municipal Fund TOTAL TAX-EXEMPT MONEY MARKET MUTUAL FUND (Cost \$24,928) |
| | TOTAL INVESTMENTS IN SECURITIES - 126.0% (Cost \$406,638,418) (b) (c) |
| 466,434,928 | OTHER ASSETS AND LIABILITIES - 2.7% PREFERRED SHARES AT REDEMPTION VALUE - (28.7)% NET ASSETS APPLICABLE TO COMMON SHAREOWNERS - 100.0% |
| NR | Security not rated by S&P or Moody's. |
| (144A) | Security is exempt from registration under Rule 144A of the Securities Act of 1933. These securities may be resold normally to qualified institutional buyers in a transaction that is exempt from registration. At July 31, 2005 the value of these securities amounted to \$976,510 or 0.3% of net assets applicable to common shareowners. |
| + | Prerefunded bonds have been collateralized by U.S. Treasury securities which are used to pay interest and principal on the tax exempt issue and to retire the bonds in full at the earliest refunding date. |
| '++ | Prerefunded bonds have been collateralized by cash sufficient to pay interest and principal on the tax exempt issue and to retire the bonds in full at the earliest refunding date. |
| (a) | Indicates a security that has a zero coupon that remains in effect until a later date when the stated coupon rate becomes effective until final maturity. |
| (b) | At July 31, 2005, the net unrealized gain on investments based on cost for financial reporting purposes of \$405,443,336 was as follows: Aggregate gross unrealized gain for all investments in which there is an excess of value over tax cost Aggregate gross unrealized loss for all investments in which there is an excess of tax cost over value Net unrealized gain For financial reporting purposes net unrealized gain on investments was \$37,418, and cost of investments aggregated \$406,638,418 |

ITEM 2. CONTROLS AND PROCEDURES.

(a) Disclose the conclusions of the registrant's principal executive officer or 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)

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under the Exchange Act (17 CFR240.13a-15(b) or 240.15d-15(b)).

The registrant's certifying officers have determined that the registrant's disclosure controls and procedures are effective based on an evaluation of these controls and procedures as of a date within 90 days prior to 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 CFR270.30a-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 was no significant change in the registrant's internal controls over financial reporting 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.

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]

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 September 29, 2005

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 September 29, 2005

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

Date September 29, 2005

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