MINNESOTA STATE BOARD OF INVESTMENT MEETING
March 2, 1988

&

INVESTMENT ADVISORY COUNCIL MEETING
March 1, 1988

MINNESOTA STATE BOARD OF INVESTMENT

Governor Rudy Perpich

State Auditor Arne H. Carlson

State Treasurer Michael A. McGrath

Secretary of State Joan Anderson Growe

Attorney General Hubert H. Humphrey III

AGENDA

STATE BOARD OF INVESTMENT
MEETING

Wednesday, March 2, 1988
9:00 A.M.
Room 118 - State Capitol
Saint Paul

		TAB
1.	Approval of Minutes of November 25, 1987	
2.	Report on Escheated Property (M. McGrath)	
3.	Reappointment of IAC Members	A
4.	Executive Director's Report (H. Bicker)	B
	A. Quarterly Investment Review (October 1-December 31, 1987)	
	1. Basic Retirement Funds	
	2. Post Retirement Fund and Other Investment Funds	
	B. Portfolio Statistics (December 31, 1987)	C
5.	Response to Auditor Carlson's Letter (T. Triplett)	
6.	Reports from Investment Advisory Council Committees (J. Yeomans)	
	A. Administrative Committee	D
	1. Update on 1987 Annual Report	
	2. Update on Pending Legislation	
	3. Revised Quarterly Report Format	
	4. Basic Funds Part IV Paper	
	5. Manager Continuation Policy Paper	
	6. Board Action to Secure Repurchase Transactions	
	B. Equity Manager Committee	E
	1. Manager Continuation Policy Paper	
	2. Manager Report Format	
	3. Recommendations on Existing Managers	
	4. Completeness Fund Policy Paper	
	C. Fixed Income Manager Committee	F
	1. Manager Continuation Policy Paper	
	2. Bond Index Fund Update	
	3. External Bond Manager Performance	
	4. BEA Contract Renewal	
	D. Alternative Investment Committee	G
	1. Strategy Review	
	2. Manager Review Meetings	
	3. Recommendations for Additional Commitments	

EXECUTIVE DIRECTOR
HOWARD J. BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT
Room 105, MEA Building
55 Sherburne Avenue
Saint Paul 55155
(612) 296-3328

MINUTES
STATE BOARD OF INVESTMENT
November 25, 1987

The State Board of Investment (SBI) met on Wednesday, November 25, 1987 at 9:00 A.M. in Room 118 of the State Capitol. Governor Rudy Perpich, Chair; Secretary of State Joan Anderson Growe; State Treasurer Michael A. McGrath; State Auditor Arne H. Carlson; and Attorney General Hubert H. Humphrey III were present.

The minutes of the October 1, 1987 meeting were unanimously approved.

Attorney General Humphrey introduced Christie Eller, who will be representing the office of the Attorney General on Board matters.

State Treasurer McGrath updated the Board on the process used for the disposition of escheated property. Mr. McGrath stated that the estimated value of the property is $75,000. He also stated that he will bring recommendations to the Board at the March 1988 meeting to either hold or dispose of this property.

EXECUTIVE DIRECTOR'S REPORT

Howard Bicker, Executive Director, stated that the Basic Retirement Funds increased in total value by 2.5% for the quarter and 21% for the year ended September 30, 1987. The total rate of return for the Basic Retirement Funds was 3.7% for the quarter, including alternative investments, and 3.9% excluding alternative investments. For the latest year the total return on the Basic Funds was 24% including alternative investments, and 26.5% excluding alternative investments. He reported the equity segment provided a 6.3% return for the quarter, which was slightly above the market. For the year, the equity segment gained a 37.6%, which was slightly below the market return. Mr. Bicker reported the bond segment provided a -2.2% return for the quarter and a 2.8% return for the latest year. Performance for both periods exceeded the market returns.

Mr. Bicker then summarized the performance of the Post Retirement Fund. He stated the market value of the Fund increased 8.7% for the year. This gain was due both to investment performance and a positive cash flow of $285 million. Mr. Bicker reported that the Post Fund contained 9% cash at the end of the previous quarter due to an increase in new retirees on June 30. During the latest quarter much of that cash was invested in bonds. As a result, cash decreased to 4.7% of the Post Fund and the bond segment saw a corresponding increase over the previous quarter. Mr. Bicker reported the equity segment of the Post Fund provided a 3.3% return for the quarter, which was less than the return available from the Wilshire 5000.

Mr. Bicker stated that as of September 30, 1987 all assets under management at the State Board of Investment were $12.1 billion.

Mr. Bicker then reviewed the effect of the October 1987 stock market decline on the Basic Retirement Funds. He reported that the Wilshire 5000 dropped 22.6% and the Dow Jones fell 24.3% for the month. While these declines are significant, Mr. Bicker pointed out that the stock market was still higher on October 31, 1987 than it was at the start of the calendar year. Mr. Bicker stated that the Basic Retirement Funds experienced a drop of approximately 13% during October. On January 1, 1987 the Basic Funds had a market value of approximately $4.474 billion. On October 31, 1987 the Funds were approximately $4.570 billion. This is a positive gain of $96 million despite the sharp declines in October.

Mr. Bicker briefly reviewed three components of the Board's 1988 legislative package. First, he reviewed the request to add authority to invest in international markets. Mr. Bicker stated this was proposed during the 1987 session but failed to obtain final approval from the Legislature, primarily due to opposition in the House of Representatives. Since that time, the request has appeared to gain support among House members. Second, Mr. Bicker reviewed the proposals that affects the Supplemental Investment Fund. The Board will request that the Bond Account be eliminated and the Guaranteed Return Account be expanded to other groups that utilize the Supplemental Fund. Third, he reviewed the suggested housekeeping changes. Originally, staff suggested two changes in this category; elimination of obsolete language in the Variable Annuity Fund and elimination of SBI review of certain elements of the state's deferred compensation plan. Mr. Bicker said the deferred compensation plan review item had been dropped after individual Board members expressed concern on this issue. Secretary of State Growe made a motion that the deferred compensation plan issue be sent to the Administrative Committee of the Investment Advisory Council for review. The motion was unanimously approved.

Mr. Bicker concluded his presentation by reviewing the terms of a proposal from the State Fund Mutual Insurance Company. Under the negotiated terms, the SBI would purchase a $10 million surplus note from the insurance company with a base interest rate of 9 1/4%. Additional compensation under the terms would bring the internal rate of return to 15.8%.

INVESTMENT ADVISORY COUNCIL REPORT

Jan Yeomans, IAC Chair, presented the Investment Advisory Council Report.

ADMINISTRATIVE AND ASSET ALLOCATION COMMITTEES

Ms. Yeomans stated the Administrative and Asset Allocation Committees met jointly during the quarter. Four information items were discussed. First, the IAC and Board meeting schedules for calendar 1988 were reviewed. Second, Ms. Yeomans reported that the fiscal year 1987 retirement benefit increase is estimated to be approximately 8%. Final calculation will be made as soon as all necessary data is available. Third, she stated that the Board's 1987 Annual Report will be available in draft form in December and is expected to be printed in January 1988. Fourth, Ms. Yeomans reported that two local police relief associations have approved mergers with PERA under legislation passed during the 1987 session. The assets of the Duluth and Buhl police plans are expected to transfer to the SBI on January 1, 1988.

Ms. Yeomans stated the Council recommends the Board approve the 1988 legislative package with the deletion of the deferred compensation issue previously discussed. Mr. McGrath moved approval. The motion passed unanimously. Ms. Yeomans reported the Council recommended adoption of Part IV of the Basic Retirement Funds' Policy Paper, which deals with performance evaluation in the Basic Retirement Funds. Mr. Carlson made a motion that the policy paper be placed on the agenda for the Board's March 1988 meeting. There was no objection.

EQUITY MANAGER COMMITTEE

Ms. Yeomans stated the Equity Committee issued a revised report at the IAC meeting on November 24, 1987 which recommends that one manager (Hellman Jordan) be terminated and four other managers be placed on probation because staff has concern about their operation and performance (see Exhibit 1). She reported that staff will recommend further action based on additional analysis and evaluation of the firms. She stated the Committee felt terminating the managers would introduce a bias in the aggregate equity portfolio that may be ill-advised at this time. In addition, she stated the Committee feels it may be possible to resolve some issues with the four managers without incurring the expense of terminating a portfolio.

Mr. Carlson stated he was present at the Equity Manager Committee meeting and questioned how the revised report was created. Mr. Bicker stated the revised report obtained the unanimous approval of the IAC and could be considered a report from full Council rather than a revised report from a committee of the Council.

Mr. Carlson stated the information used to evaluate the managers was not presented clearly and he cited inconsistencies between the staff evaluation of managers that were chosen for retention, probation and termination. In response to a question from Mr. Carlson, Ms. Yeomans stated the IAC felt termination of all managers who were not rated highly on this set of criteria would leave the entire equity segment with a strong growth bias. This could make the portfolio vulnerable in the current market environment. Mr. Carlson asked if the managers had ever outperformed the index fund. Dave Tierney, Richards & Tierney, stated the managers have added approximately $13 million in value to the Basic Funds over the last twelve months.

Ms. Growe asked that the summary ranking sheet be explained. Mr. Bicker and Mr. Tierney discussed each column of figures and responded to additional questions from Ms. Growe concerning either the qualitative or quantitative measures associated with each type of rating.

In response to a question from Mr. Carlson, Mr. Tierney and Mr. Bicker explained that implementation of a completeness fund is necessary to ensure that the equity segment, in aggregate, will outperform the Wilshire 5000 index. Mr. Carlson then stated that Board members are not able to effectively evaluate managers because they are continually told additional time and new analyses are necessary before action can be taken.

Ms. Growe stated she would not be hesitant to dismiss any manager that was not performing up to the Board's expectations, but she had some concern about the degree of subjectivity in the evaluation. Ms. Growe suggested the Board ask the IAC Equity Committee to review the entire process used to evaluate the managers and report their findings back to the Board. Mr. Humphrey agreed and reiterated Ms. Growe's concern about the degree of subjectivity incorporated in the present ratings. In response to a question from Mr. McGrath, Mr. Bicker and Mr. Tierney stated the value added to the portfolio by each manager could be calculated and reported to the Board.

In response to a question from Mr. Carlson, Ms. Yeomans stated it would be feasible to dismiss managers in the future, provided a back-up strategy was in place which allows the Board to avoid the risk of significant underperformance relative to an aggregate benchmark. Mr. Carlson made a motion that the IAC report be adopted with the understanding that the backup strategy will be presented to the Board by March 1988 and that final review of existing managers will take place at that time. Mr. Carlson accepted a further amendment by Ms. Growe which requires the staff to notify the four managers on probation in writing and include the specific reasons for the Board's action. The motion passed unanimously.

FIXED INCOME COMMITTEE

Ms. Yeomans reported on three information items reviewed by the Committee. First, she stated that the performance of the external bond managers had been satisfactory and no changes are recommended at this time. Second, she stated the bond index fund will be established in July 1988. A reallocation from existing active managers to the passive managers will occur at the same time. Third, Ms. Yeomans reported that the bidding process for the 1987-1990 guaranteed investment contract in the Supplemental Fund was completed. The winning bid was 8.45% from Principal Mutual Life.

Ms. Yeomans then reported on three action items from the Committee. First, she stated the Committee recommended that the Board renew its contract with Bankers Trust to rebalance the dedicated bond portfolio. She stated the Committee also recommended that staff review other available vendors before the contract is renewed again. Ms. Growe moved approval. The motion passed unanimously. Second, Ms. Yeomans reported that the Committee recommended adoption of the staff position paper on construction of a bond index fund. Mr. McGrath moved approval. The motion was unanimously approved. Third, Ms. Yeomans stated that the Committee recommended the Board accept the surplus note from the State Fund Mutual Insurance Company that was reviewed earlier in the meeting by Mr. Bicker. Mr. Carlson moved approval. The motion passed unanimously.

ALTERNATIVE INVESTMENT COMMITTEE

Ms. Yeomans stated that the Alternative Investment Committee had no action items. She said the Committee is actively looking for new investments but is having difficulty finding them in the current market environment.

Mr. Carlson referred to a letter he sent to members of the Board concerning SBI policy and operations (see Exhibit 2). After reviewing several of the points in the letter, Mr. Carlson made a motion to adopt the suggested actions contained in part one of the letter and adopt the quarterly report format he provided. Mr. McGrath seconded the motion.

Ms. Growe agreed with Mr. Carlson concerning the Board members' need to develop a relationship with the consultant and meet more frequently. Mr. Tierney stated that he and Tom Richards would be happy to arrange such meetings. Ms. Growe suggested the Administrative Committee of the IAC develop a response to the issues raised in Mr. Carlson's letter. Mr. Carlson stated he did not want the issues in part one of his letter referred to the IAC. Mr. Humphrey stated he would like additional time to review the issues Mr. Carlson raised and suggested that staff be directed to bring all the issues back to the Board. Mr. Carlson agreed and his motion was withdrawn.

The meeting adjourned at 10:50 A.M.

Respectfully submitted,

Howard Bicker

Howard J. Bicker
Executive Director

Attachments

EXHIBIT 1

EXECUTIVE DIRECTOR
HOWARD J. BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

Room 105, MEA Building
55 Sherburne Avenue
Saint Paul 55155
(612) 296-3328

November 24, 1987

TO: Members, State Board of Investment
Members, Investment Advisory Council

FROM: Equity Manager Committee

SUBJECT: Revised Committee Report

The Committee revised its original recommendation regarding the Board's equity managers. The Committee recommends that the investment management agreement of Hellman Jordan be terminated effective December 31, 1987.

The Committee recommends that the assets of Hellman Jordan be equally distributed in kind to each of the following managers: Alliance Capital, IDS Advisory and Forstmann Leff. These three managers ranked high in the recent staff evaluations.

Further, the Committee recommends that the following four managers be placed on probation:

1. Beutel Goodman
2. Investment Advisers
3. Peregrine Capital
4. Waddell & Reed

These four managers ranked low in the recent staff manager evaluation.

The Committee adopted a staff recommendation to establish a more formal manager continuation policy. The staff proposed a policy which focuses on the level and consistency of performance as well as qualitative considerations regarding the manager's organization and investment approach. The Committee will bring specific recommendations regarding acceptable levels of manager performance, and the time frames over which manager performance should be reviewed, to the Board at its March meeting.

The Committee also heard a progress report regarding the implementation of a completeness fund. A staff analysis of the existing equity management structure indicates that the current level of misfit is not material. The Committee recommends that the implementation of a completeness fund be postponed.

The Committee also recommended that the staff continue its efforts in the completeness fund area. Staff will provide an analysis of the impact of the proposed manager terminations on the level of misfit. Staff will report the results of its analysis along with a recommendation to the Committee as part of a completeness fund position paper scheduled to be presented to the Board at its next meeting.

SUMMARY OF EXTERNAL MANAGERS

				Value of Active Mgmt.				Subjective Ratings			
	Market Value 9/30/87 (Mil)	Annualized Performance (1Q84-3Q87)	Annualized Benchmark (1Q84-3Q87)	VAM Annualized (1Q84-3Q87)	2 Year Rolling Average (4Q85-3Q87)	Batting Average	Confidence Indicator	Org.	Invest. Appr.	Perf.	Overall
Alliance	$ 150.5	26.71%	17.62%	9.10%	11.42%	0.800	3.15	7	7	10	9
Fred Alger	$ 131.0	19.33%	20.59%	-1.26%	-0.69%	0.600	-0.39	5	7	5	5
BMI	$ 85.9	15.44%	17.48%	-2.03%	1.88%	0.600	-0.48	4	7	5	5
Beutel	$ 144.4	19.51%	22.82%	-3.32%	-6.74%	0.533	-0.94	5	5	2	3
Forstmann	$ 116.6	20.82%	16.72%	4.10%	10.46%	0.571	0.98	3	7	8	7
Hellman	$ 107.1	22.42%	21.74%	0.67%	-0.76%	0.467	0.18	1	1	5	2
IDS	$ 122.5	24.35%	21.68%	2.66%	4.38%	0.733	1.06	4	7	9	8
IAI	$ 111.0	20.83%	21.82%	-0.99%	-0.17%	0.400	-0.38	3	3	2	3
Lieber	$ 49.0	18.25%	17.15%	1.10%	-1.09%	0.467	0.61	4	8	7	7
Peregrine	$ 109.6	18.98%	18.69%	0.29%	-6.11%	0.467	0.11	3	5	3	3
Waddell	$ 127.6	18.38%	21.93%	-3.55%	-3.08%	0.533	-0.87	5	5	2	3
Index Fund	$2,301.6	21.76%	21.87%	NA	NA	NA	NA				
Wilshire 5000		22.00%									
90 Day T Bills		7.71%									
Inflation (CPI)		3.08%									

EXHIBIT 2

STATE OF MINNESOTA

OFFICE OF THE STATE AUDITOR

SAINT PAUL 55103

612-296-2551

ARNE H. CARLSON
STATE AUDITOR

STATE EXECUTIVE COUNCIL
STATE BOARD OF INVESTMENT
LAND EXCHANGE BOARD
HOUSING FINANCE AGENCY
RURAL FINANCE ADMINISTRATION
PRESIDENT, PUBLIC EMPLOYEES
RETIREMENT ASSOCIATION

November 19, 1987

The Honorable Rudy Perpich
Governor of Minnesota
Room 130 Capitol Building
St. Paul, Minnesota 55155

Dear Rudy:

At the next meeting of the State Board of Investment, I will make a series of suggestions that I feel will more clearly define the role of the State Board of Investment relative to the staff, the Investment Advisory Council, and the consultant. For purposes of organization, let me divide the matter into two parts:

I. MANAGEMENT

a. Our Board has an obligation to review the budget of the State Board of Investment prior to submission to the Legislature and prior to its implementation. This review should also include a salary schedule.

b. At each meeting of the State Board of Investment, staff should submit to the Board, for review, a statement of budget-to-actual in order to give us information relative to what has been spent compared to the allocation.

c. The review of the annual budget should also contain all anticipated travel by members of the staff. Any additional travel should be disclosed to the Board at a meeting prior to the travel expenditure.

d. Annually, each member of the Board should submit an evaluation of its employee, the Executive Director, on the prescribed form.

e. We should make absolutely certain that all staff is aware of the fact that it is governed by Minnesota Statutes, Section 43A.48 which defines a code of ethics for employees in the Executive Branch.

f. The Board should make certain that staff submits to the Board its plans for the annual orientation meeting. As you know, this proposal emanated from the Board and we should not lose control of it. I would personally suggest that the Chairman of the State Board of Investment open the conference and that other members of the Board introduce various speakers and play a meaningful role in the conference. After all, this is our conference and we are the hosts and hostesses.

II. POLICY

a. The relationship between the Board and the consultant should be more clearly defined. It should be understood that the consultant works for us, not the staff or the IAC. There is a reason for that line of authority and it relates to our fiduciary responsibility. I would look to the consultant as an individual who meets with us, as members of the Board, individually and collectively, for the purpose of sharing with us his best judgment relative to the guidance of the funds.

Part of his responsibilities should include the following:

1. A review of the investment strategy that has been adopted by the State Board of Investment. Did we lay out the right course of action? Was our asset allocation strategy appropriate? Did our active managers outperform their own benchmarks and how did they do against various industry indexes?

2. The consultant should assist us in explaining why active equity management has fallen so far behind the performance of the Wilshire 5000 Index Fund. The primary purpose of active management is to add value and a losing strategy warrants very close scrutiny.

3. The consultant should assist us in evaluating the quality and quantity of our staff operations.

4. The consultant should assist us in designing a system that evaluates our overall performance relative to other public funds as well as private funds. I think it is important for us to know how we are doing against Honeywell, 3M, General Motors, etc.

b. Staff should be directed to reorganize the presentation of its data so that it lends itself to an easier understanding of how we evaluate outside managers. I have submitted to Howard Bicker a form that will alleviate this problem. It includes the following items - name of manager, the amount of money allocated, the quarterly period, manager's portfolio results on a quarterly basis, manager's benchmark results on a quarterly basis, the rolling two or three-year figure, and quarterly numbers for the performance of the S & P, Wilshire 5000, and the CPI. The same would be applicable on the bond side except the appropriate bond indices would be used. There should also be the annual results of outside managers, annual results of internal managers and annual results for the Index Fund vs. the appropriate stocks and bonds indexes.

I have attached a copy of this form.

I very much appreciate your help and understanding in this matter. Further, I hope that if you have any questions, you will feel free to call me.

Warmest regards,

ARNE H. CARLSON
State Auditor

AHC:mgt

Enclosure

PROPOSED TABLE
(From inception of the use of outside managers)

Manager	Amount of assets	Quarterly Period	Manager's Portfolio	Benchmark Quarterly	Rolling two-year	S & P	Wilshire 5000	CPI
Annual results for outside managers		vs.		S & P			Wilshire 5000	
Annual results for internal managers		vs.		S & P			Whilshire 5000	
Annual results for Index Fund		vs.		S & P			Whilshire 5000	

(Same applies to appropriate bond indexes)

AGENDA

INVESTMENT ADVISORY COUNCIL
MEETING

Tuesday, March 1, 1988
2:00 P.M.
MEA Building - Conference Room "A"
41 Sherburne Avenue
Saint Paul

		TAB
1.	Approval of Minutes of November 24, 1987	
2.	Executive Director's Report (H. Bicker)	B
	A. Quarterly Investment Review (October 1-December 31, 1987)	
	1. Basic Retirement Funds	
	2. Post Retirement Fund and Other Investment Funds	
	B. Portfolio Statistics (December 31, 1987)	C
3.	Response to Auditor Carlson's Letter (T. Triplett)	
4.	Reports from Investment Advisory Council Committees	
	A. Administrative Committee (T. Triplett)	D
	1. Update on 1987 Annual Report	
	2. Update on Pending Legislation	
	3. Revised Quarterly Report Format	
	4. Basic Funds Part IV Paper	
	5. Manager Continuation Policy Paper	
	6. Board Action to Secure Repurchase Transactions	
	B. Equity Manager Committee (J. Eckmann)	E
	1. Manager Continuation Policy Paper	
	2. Manager Report Format	
	3. Recommendations on Existing Managers	
	4. Completeness Fund Policy Paper	
	C. Fixed Income Manager Committee (G. Norstrem)	F
	1. Manager Continuation Policy Paper	
	2. Bond Index Fund Update	
	3. External Bond Manager Performance	
	4. BEA Contract Renewal	
	D. Alternative Investment Committee (K. Gudorf)	G
	1. Strategy Review	
	2. Manager Review Meetings	
	3. Recommendations for Additional Commitments	

EXECUTIVE DIRECTOR
HOWARD J. BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

Room 105, MEA Building
55 Sherburne Avenue
Saint Paul 55155
(612) 296-3328

MINUTES
INVESTMENT ADVISORY COUNCIL

November 24, 1987

The Investment Advisory Council met on Tuesday, November 24, 1987 at 2:00 P.M. in the MEA Building, St. Paul.

MEMBERS PRESENT: Harry Adams, James Eckmann, Elton Erdahl, Paul Groschen, James Hacking, Vern Jackels, Malcolm McDonald, Judy Mares, Gary Norstrem, Joe Rukavina, Tom Triplett, Ray Vecellio, Debbie Veverka, and Jan Yeomans.

MEMBERS ABSENT: Ken Gudorf

SBI STAFF: Howard Bicker, Jeff Bailey, Beth Lehman, John Griebenow, Harriet Balian, Charlene Olson.

OTHERS ATTENDING: Shane Allers, Gary Austin, Arne Carlson, Christie Eller, John Gardner, Jim Heidelberg, Richard Helgeson, Michael McGrath, Jake Manahan, David Tierney, Elaine Voss, and Robert Whitaker.

The minutes of the June 2 and October 1, 1987 meetings were approved.

Jan Yeomans, IAC Chair, recognized State Auditor Carlson. Mr. Carlson distributed copies of a letter he sent to Board members which presented his concerns about staff operations and oversight by the Board. Mr. Carlson referred to a report he prepared in 1980 which was critical of the performance of the State Board of Investment. He stated the SBI had shown improvement since that time, but that some questions raised by the report had not been resolved. Mr. Carlson said there are several questions regarding performance that need to be addressed, particularly with respect to equities performance. These include the performance of passive management compared to active management and the performance of internal management compared to external management. He stated he had other concerns about the oversight of SBI operations including the reporting relationship of the consultant; the effectiveness and evaluation of SBI's investment policies; and the evaluation of staff operations. Mr. Carlson stated he believes the Board is growing more isolated and does not sufficiently understand and monitor investment policy and SBI operations.

Several persons spoke after Mr. Carlson completed his opening comments. Howard Bicker stated the SBI has attempted to provide background information in several ways: the recent Spring Hill seminar; the annual investment conference sponsored by the Board; orientation sessions for new Board and IAC members; and response to specific questions from Board members and others about SBI operations. Treasurer McGrath asked to be recognized from the audience and stated that he found Mr. Bicker and his staff to be responsive to his needs as a new Board member. Judy Mares said she felt Mr. Carlson's comments indicated the Board has lost sight of the IAC as an oversight body. She stated the IAC members have expended a great deal of time and effort to review staff operations and to make sound recommendations to the Board on all of the SBI's investment policies and procedures. Joe Rukavina suggested the function of the IAC may need to be redefined and Malcolm McDonald suggested the Administrative Committee of the IAC would be the appropriate body to do so. Gary Norstrem stated it appeared the relationships of the IAC to the staff and of the IAC to the Board needed to be explored. Ms. Mares said the IAC should make a clear statement to the Board about the IAC's role and suggested the IAC needs to know how the Board views the IAC. Ms. Yeomans concluded the discussion by stating the IAC needed to formulate a response to Mr. Carlson's letter.

EXECUTIVE DIRECTOR'S REPORT

Mr. Bicker stated that the Basic Retirement Funds increased in total value by 2.5% for the quarter and 21% for the year ended September 30, 1987. The total rate of return for the Basic Retirement Funds was 3.7% for the quarter, including alternative investments, and 3.9% excluding alternative investments. For the latest year the total return on the Basic Funds was 24% including alternative investments, and 26.5% excluding alternative investments. He reported the equity segment provided a 6.3% return for the quarter, which was slightly above the market. For the year, the equity segment gained a 37.6%, which was slightly below the market return. Mr. Bicker reported the bond segment provided a -2.2% return for the quarter and a 2.8% return for the latest year. Performance for both periods exceeded the market returns.

Mr. Bicker then summarized the performance of the Post Retirement Fund. He stated the market value of the Fund increased 8.7% for the year. This gain was due both to investment performance and a positive cash flow of $285 million. Mr. Bicker reported that the Post Fund contained 9% cash at the end of the previous quarter due to an increase in new retirees on June 30. During the latest quarter much of that cash was invested in bonds. As a result, he said, cash decreased to 4.7%

of the Post Fund and the bond segment saw a corresponding increase over the previous quarter. Mr. Bicker reported the equity segment of the Post Fund provided a 3.3% return for the quarter, which was less than the return available from the Wilshire 5000.

Mr. Bicker stated that as of September 30, 1987 all assets under management at the State Board of Investment were $12.1 billion.

Mr. Bicker then reviewed the effect of the October 1987 stock market decline on the Basic Retirement Funds. He reported that the Wilshire 5000 dropped 22.6% and the Dow Jones fell 24.3% for the month. While these declines are significant, Mr. Bicker pointed out that the stock market was still higher on October 31, 1987 than it was at the start of the calendar year. As a result, the stock market still provided a positive return for calendar year. Mr. Bicker stated that the Basic Retirement Funds experienced a drop of approximately 13% during October. On January 1, 1987 the Basic Funds had a market value of approximately $4.474 billion. On October 31, 1987 the Funds were approximately $4.570 billion. This represents a positive gain of $96 million despite the sharp declines in October.

Mr. Bicker briefly reviewed three components of the Board's 1988 legislative package. First, he reviewed the request to add authority to invest in international markets. Mr. Bicker stated this was proposed during the 1987 session but failed to obtain final approval from the Legislature, primarily due to opposition in the House of Representatives. Since that time, the request has appeared to gain support among House members. Second, Mr. Bicker reviewed the proposals that affect the Supplemental Investment Fund. The Board will request that the Bond Account be eliminated and the Guaranteed Return Account be expanded to other groups that utilize the Supplemental Fund. Third, he reviewed the suggested housekeeping changes. Originally, staff suggested two changes in this category; elimination of obsolete language in the Variable Annuity Fund and elimination of SBI review of certain elements of the state's deferred compensation plan. Mr. Bicker informed the IAC that the proposal concerning deferred compensation review had been dropped after his discussions with Board members.

Mr. Bicker concluded his presentation by reviewing the terms of a proposal from the State Fund Mutual Insurance Company. Under the negotiated terms, the SBI would purchase a $10 million surplus note from the insurance company with a base interest rate of 9 1/4%. Additional compensation under the terms brings an internal rate of return to 15.8%.

INVESTMENT ADVISORY COUNCIL COMMITTEE REPORTS

ADMINISTRATIVE AND ASSET ALLOCATION COMMITTEE REPORTS

Jan Yeomans stated the Administrative and Asset Allocation Committees met jointly during the quarter. Four information items were discussed. First, the IAC and Board meeting schedules for calendar 1988 were reviewed. Second, Ms. Yeomans reported that the fiscal year 1987 retirement benefit increase is estimated to be approximately 8%. Final calculation will be made as soon as all necessary data is available. Third, she stated that the Board's 1987 Annual Report will be available in draft form in December and is expected to be printed in January 1988. Fourth, Ms. Yeomans reported that two local police relief associations have approved mergers with PERA under legislation passed during the 1987 session. She said the assets of the Duluth and Buhl police plans are expected to transfer to the SBI on January 1, 1988.

Ms. Yeomans said the Committee recommends the IAC approve the legislative proposals reviewed by Mr. Bicker earlier in the meeting. She also stated the Committee recommends approval of Part IV of the Basic Retirement Funds Policy Paper concerning performance evaluation. A motion was made to accept the Committee report. The motion passed unanimously.

EQUITY MANAGER COMMITTEE REPORT

Debbie Veverka stated the Committee reviewed staff evaluations of the external managers. She reported the Committee originally recommended that three managers be terminated (Hellman Jordan, Investment Advisers, Peregrine Capital). This recommendation is reflected in the Committee report dated November 17, 1987. Ms. Veverka said subsequent discussion among Committee members has changed this recommendation and she distributed a revised committee report dated November 24, 1987. She stated the Committee felt terminating the managers would introduce a bias in the aggregate equity portfolio that may be ill-advised at this time. In addition, she stated the Committee feels it may be possible to resolve some issues with the four managers without incurring the expense of terminating a portfolio. She stated the Committee now recommends that the contract with one manager (Hellman Jordan) be terminated and its assets be distributed to three existing managers, IDS Advisory, Alliance Capital and Forstmann Leff. Ms. Veverka stated the Committee further recommends that four managers be placed on probation (Beutel Goodman, Investment Advisers, Peregrine Capital and Waddell & Reed). Mr. Rukavina moved approval of the revised Committee report. The motion passed unanimously.

FIXED INCOME COMMITTEE REPORT

Gary Norstrem reported on three information items reviewed by the Committee. First, he stated that the performance of the external bond managers had been satisfactory and no changes are recommended at this time. Second, he stated the bond index fund will be established in July 1988. A reallocation from existing active managers to the passive managers will occur at the same time. Third, Mr. Norstrem reported that the bidding process for the 1987-1990 guaranteed investment contract in the Supplemental Fund was completed. The winning bid was 8.45% from Principal Mutual Life.

He then reported on three action items from the Committee. First, Mr. Norstrem said the Committee recommended that the Board renew its contract with Bankers Trust to rebalance the dedicated bond portfolio. He said the Committee also recommended that staff review other available vendors before the contract is renewed again. Second, he reported that the Committee recommended adoption of the staff position paper on construction of a bond index fund. Third, he stated that the Committee recommended the Board accept the surplus note from the State Fund Mutual Insurance Company that was reviewed earlier in the meeting by Mr. Bicker. Mr. Norstrem moved approval of the Committee Report. The motion passed unanimously.

ALTERNATIVE INVESTMENT COMMITTEE REPORT

Mr. McDonald stated that the Alternative Investment Committee is actively looking for new investments but is having difficulty finding them in the current market environment. There were no action items discussed by the Committee.

The meeting adjourned at 3:00 P.M.

Respectfully submitted,

Howard Bicker

Howard J. Bicker
Executive Director

Tab A

EXECUTIVE DIRECTOR
HOWARD J BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

Room 105, MEA Building
55 Sherburne Avenue
St Paul, MN 55155
Tel (612) 296-3328
FAX (612) 296-9572

February 25, 1988

TO: Members, State Board of Investment

FROM: Howard Bicker

SUBJECT: Reappointment of IAC Members

Terms of the following Board appointees to the Investment Advisory Council (IAC) have expired:

Henry A. Adams
Executive Secretary/Investment Manager
Minneapolis Teachers Retirement Fund

James Eckmann
Assistant Treasurer
Dayton Hudson Corporation

Kenneth Gudorf
Chief Financial Officer & Vice President of Finance
Carlson Companies, Inc.

Deborah Veverka
Manager Pension Financial Planning & Control
Honeywell Inc.

Expirations of the four appointments were announced in the State Register as part of the Open Appointments Process. No new applications were received.

Each of the four members listed above has submitted an application for reappointment. If it chooses to do so, the Board can take action to appoint these four members to new four year terms at its meeting on March 2, 1988. The appointments would be effective until January 1992.

If these four members are reappointed, two other Board appointee positions on the IAC are currently vacant due to resignations by past IAC members. These two vacancies will be announced through the Open Appointments Process during the next quarter.

In the past, the Board has created an ad hoc committee composed of one designee of each Board member to review applications for new IAC members. If the Board chooses to follow this practice, the Committee could make recommendations on new appointments at the June 1988 Board meeting.

Tab B

The executive summary highlights the asset mix, performance standards and investment results for the Basic Retirement Funds and the Post Retirement Fund.

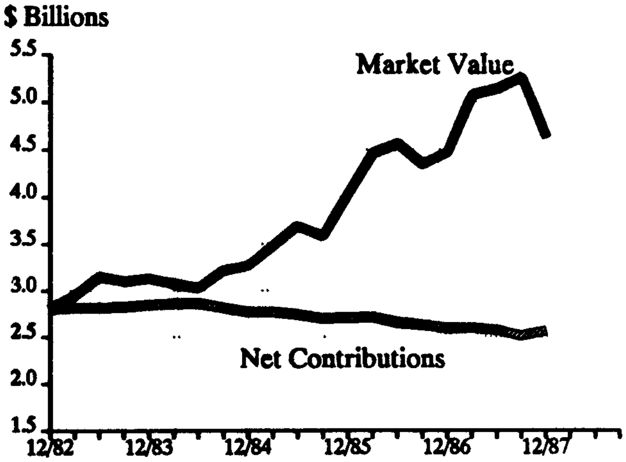
Additional detail on these funds as well as information on other funds managed by the Board can be found in the body of the Quarterly Investment Report.

EXECUTIVE SUMMARY

Basic Retirement Funds

Asset Growth

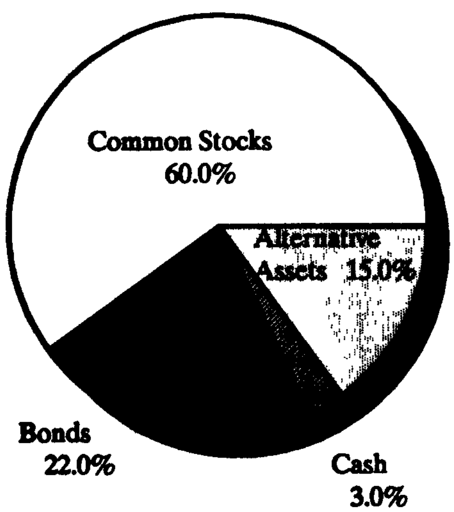
The market value of the Basic Funds decreased 12.1% during fourth quarter 1987. The decrease was attributable to October's sharp drop in the stock market. The Basic Funds benefited from portfolio diversification during the quarter. Positive performances by the other asset segments mitigated the negative impact of common stocks on the Basic Funds' ending market value. In addition, the Basic Funds received net contributions of $57 million during the quarter.



Asset Growth During Fourth Quarter 1987 (Millions)

Beginning Value	$5,264
Net Contributions	57
Investment Return	-693
Ending Value	$4,628

Asset Mix



Policy Asset Mix

The asset mix of the Basic Funds is chosen to maximize long term rate of return. This requires a large commitment to common stocks. Other asset classes are used to limit short-run return volatility and to diversify portfolio holdings.

The Basic Funds' asset mix changed significantly during the fourth quarter. A decrease in the stock segment weighting and a concomitant increase in the bond weighting occurred as a result of the widely divergent performances of the common stock and bond markets. The cash segment was temporarily overweighted due to the receipt of a large contribution at the quarter's-end.

	Actual Market Value (Millions)	Actual Mix 12/31/87
Common Stocks	$2,478	53.6%
Bonds	1,047	22.6
Cash*	492	10.6
Alternative Investments	611	13.2
	$4,628	100.0%

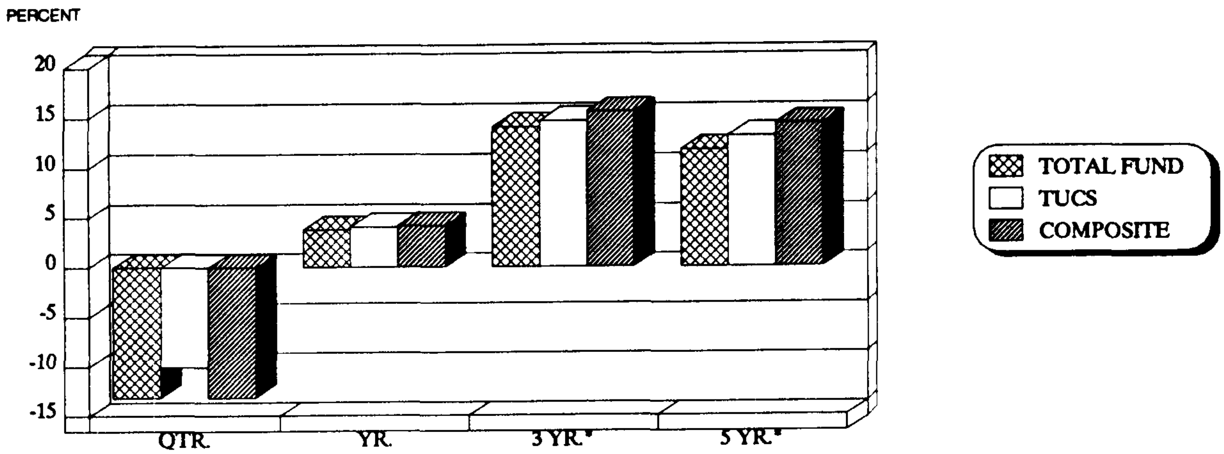
* Includes cash uncommitted to long-term assets plus all cash held by external managers.

Basic Funds (Con't.)

Total Fund Performance

The Basic Funds' total portfolio failed to meet its assigned performance standards for the most recent quarter and year.

Given its large commitment to common stocks, the Basic Funds can be expected to outperform other balanced pension portfolios during periods of positive stock performance and underperform during periods of negative stock performance.



Period Ending 12/31/87

	Qtr.	Yr.	*(Annualized) 3 Yr.	5 Yr.
Total Fund	-13.2%	3.8%	14.1%	11.8%
Total Fund Without Alternative Assets	-15.0	3.2	14.8	12.2
TUCS** Median Balanced Fund	-10.1	4.1	14.7	13.2
Stock/Bond/Cash/Composite	-13.2	4.2	15.6	14.4

** Trust Universe Comparison Service (TUCS) includes returns of over 800 public and private tax-exempt investors

Stock Segment Performance

The Basic Funds' common stock segment outperformed its target for the latest quarter and year. Details on individual manager stock performance can be found on page 7 of the report.

	Qtr.	Yr.	(Annualized) 3 Yr.	5 Yr.
Stock Segment	-22.5%	2.6%	15.8%	12.4%
Wilshire 5000	-23.1	2.3	16.3	14.9

Bond Segment Performance

The bond segment of the Basic Funds trailed the performance of its target for the quarter but exceeded its target for the latest year. Details on individual bond manager performance can be found on page 8 of the report.

	Qtr.	Yr.	(Annualized) 3 Yr.	5 Yr.
Bond Segment	5.2%	2.8%	12.8%	12.5%
Salomon Broad Index	5.8	2.6	13.1	12.5

EXECUTIVE SUMMARY

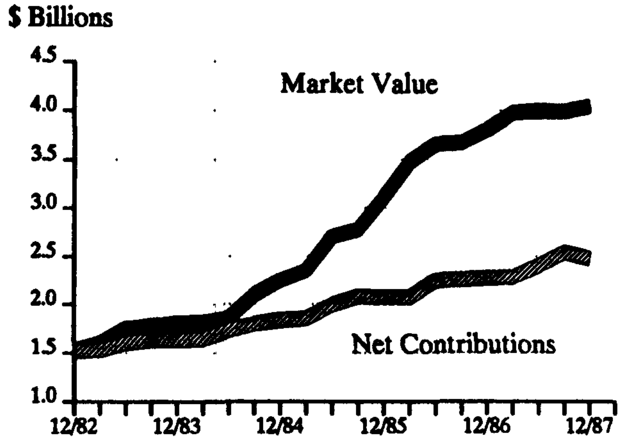
Post Retirement Fund

Asset Growth

The market value of the Post Fund increased by 1.4% during fourth quarter 1987. The modest asset growth occurred despite net withdrawals from the Fund of over $62 million. The Post Fund was aided during the period by its sizable exposure to bonds which, unlike stocks, generated a positive performance.

Asset Growth During Fourth Quarter 1987 (Millions)

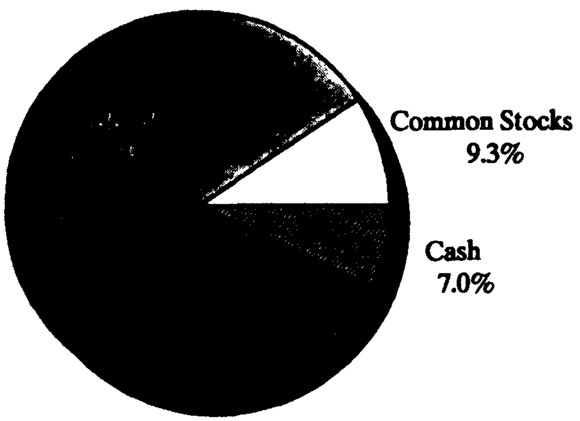
Beginning Value	$3,991
Net Contributions	-62
Investment Return	118
Ending Value	$4,047



Asset Mix

The asset mix of the Post Retirement fund is chosen to create a sizable, steady stream of income sufficient to pay currently promised benefits. This income stream is created by a large commitment to bonds, primarily through a dedicated bond portfolio. Assets not committed to bonds are invested in cash equivalents or common stocks.

The common stock segment of the Post Fund was reduced in size during the fourth quarter. Some stocks were sold from the portfolio in anticipation of the dedicated bond portfolio rebalancing scheduled for first quarter 1988. As a result, the cash segment of the Fund grew in size as stock proceeds were temporarily placed in cash equivalents. The size of the dedicated bond portfolio will increase in first quarter 1988 to accomodate additional liabilities generated by an increase in new retirees.



Actual Asset Mix 12/31/87

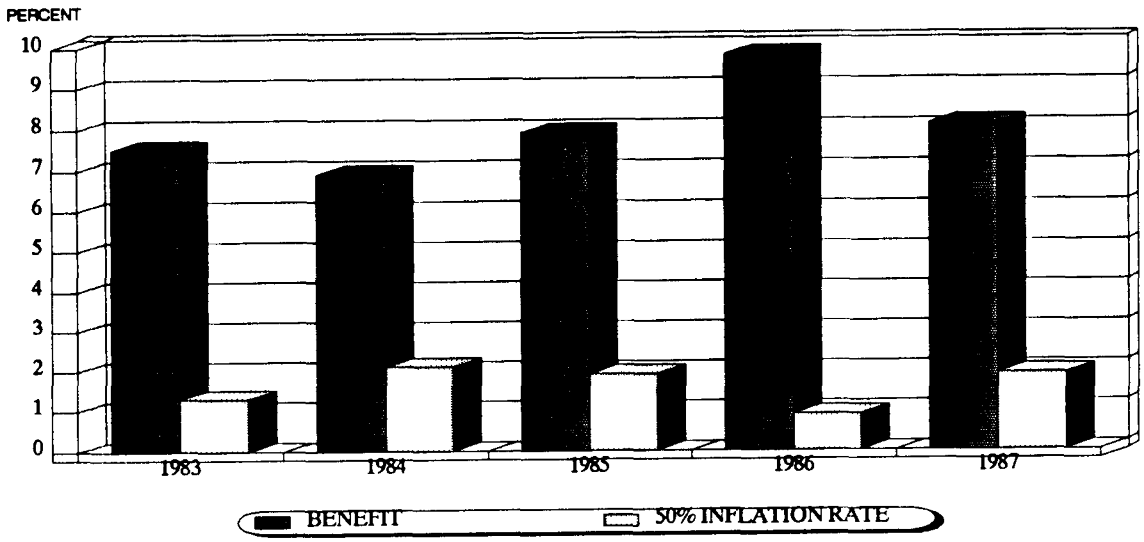
	Actual Market Value (Millions)	Asset Mix 12/31/87
Common Stocks	$376	9.3%
Bonds	3,386	83.7
Cash	285	7.0
	$4,047	100.0%

Post Fund (Con't.)

Total Fund Performance

Assets committed to the dedicated bond portfolio ensure that all existing promised benefits will be paid to current retirees. Excess investment earnings on Post Fund assets are used to finance permanent lifetime benefit increases for retirees.

Benefit increases generated over the last five years are shown below.



	Fiscal Year					(Annualized)	
	1983	1984	1985	1986	1987	3 Yrs.	5 Yrs.
Benefit Increases	7.5%	6.9%	7.9%	9.8%	8.1%	8.6%	8.0%
50% Inflation	1.3	2.1	1.9	0.9	1.9.	1.6	1.6

Stock Segment Performance

The stock segment of the Post Fund underperformed the broad stock market for the quarter and the most recent year.

Performance was negatively impacted by the equity portfolio's substantial overweighting in the finance sector.

Period Ending 12/31/87			(Annualized)	
	Qtr.	Yr.	3 Yr.	5 Yr.
Stock Segment	-23.8%	-4.0%	8.4%	9.4%
Wilshire 5000	-23.1	2.3	16.3	14.9

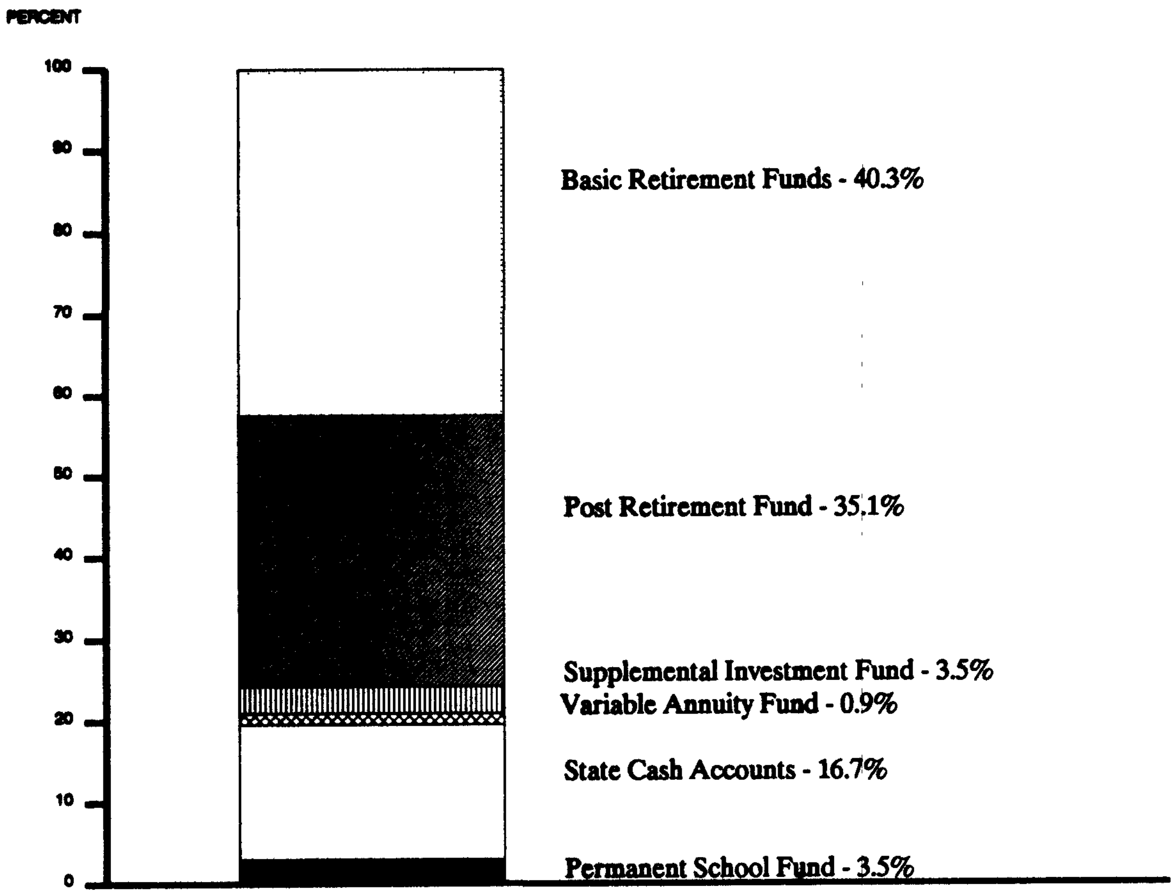
Bond Segment Performance

At the close of the quarter, the dedicated bond portfolio had a current yield of 9.10% and average duration of 6.87 years. The market value of the dedicated bond portfolio was $2.6 billion at the end of the quarter.

The dedicated bond portfolio is designed such that cash inflows from portfolio income and principal payments match required cash outflows to retirees. Thus, total return is not a relevant performance measure for the portfolio. Nevertheless, the bond segment provided a 7.6% return for the quarter and a -0.3% return for the year. This is consistent with the design of the dedicated bond portfolio.

EXECUTIVE SUMMARY

Funds Under Management



	12/31/87 Market Value (Billions)
Basic Retirement Funds	$4.6
Post Retirement Fund	4.0
Supplemental Investment Fund	0.4
Variable Annuity Fund	0.1
State Cash Accounts	1.9
Permanent School Fund	0.4
Total	$11.4

MINNESOTA STATE BOARD

OF INVESTMENT

INVESTMENT REPORT

Fourth Quarter 1987

(October 1, 1987 - December 31, 1987)

Table of Contents

FINANCIAL MARKETS REVIEW

STOCK MARKET

While the drop in stock prices on October 19, 1987 was the largest in history, it is useful to put that decline into a larger context. As the cumulative return chart below shows, the price gain on stocks over the last five to six years has been one of the largest on record. Fourth quarter declines were dramatic, but they did not negate the effect of the extraordinarily strong gains made in recent years.

The stock market experienced a good recovery in December but these gains were not sufficient to compensate for earlier losses. As a result, the Wilshire 5000 provided a total return of -23.1% for the quarter. Because the market was very strong in previous quarters, the Wilshire index gained 2.3% for the year.

There was a wide disparity in the price performance of different sectors during the year. Basic materials and technology sectors were the best performing industry groups with returns of 24% and 14% respectively. The two worst performing sectors were financial stocks which declined 18% and utilities which were down 3%.

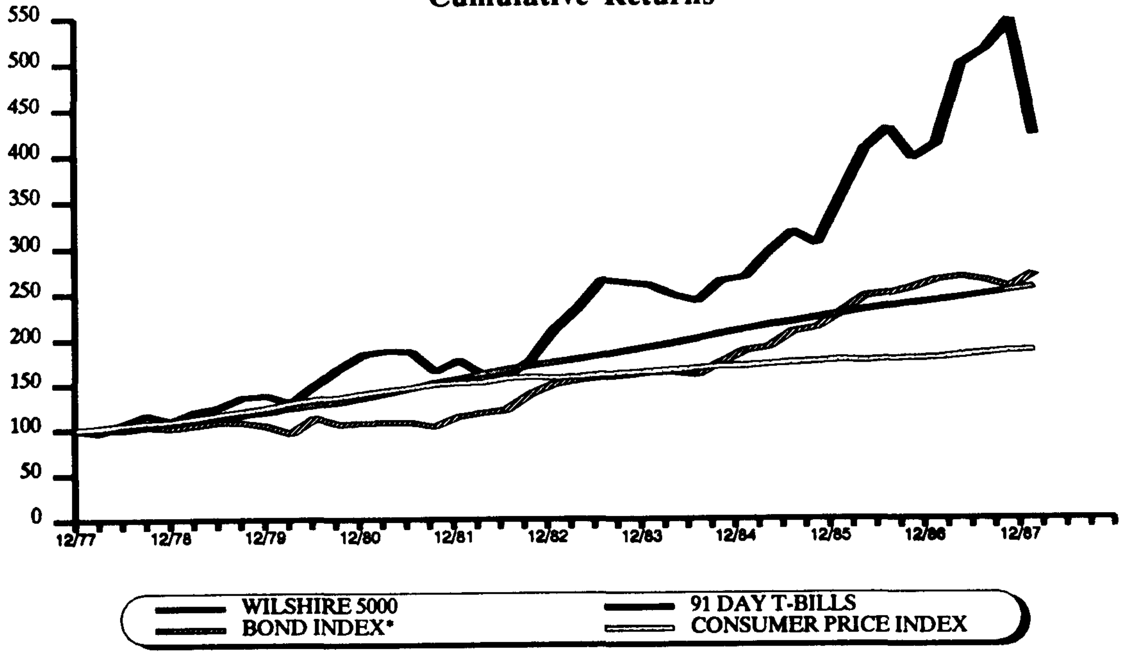
BOND MARKET

In sharp contrast to stock performance, the bond market made strong gains during the quarter. After the October 19th decline, the Federal Reserve injected monetary reserves causing a drop in short term interest rates. This is turn led to a rally in long-term bond prices during the quarter. Interest rates ended the year slightly higher than at the start of the year. However, interest income was sufficient to offset capital losses associated with the rise in interest rates. As a result, bonds provided positive total returns over the last year.

The Salomon Brothers Broad Investment Grade Index gained 5.8% for the quarter and provided a 2.6% return for the year. The best performing sector was mortgages with a gain of 4.1% for the year. Treasury issues provided the lowest return at 1.9%.

PERFORMANCE OF CAPITAL MARKETS

Cumulative Returns



* Merrill Lynch Master Index through 12/79; Salomon Broad Investment Grade Bond Index thereafter

FINANCIAL MARKETS REVIEW

REAL ESTATE

The real estate market currently faces oversupply and slow demand growth. These factors are most apparent in second tier office properties, small shopping centers and properties located in the Southwest. The stronger sectors of the real estate market include warehouse and distribution facilities and larger retail centers. Current supply/demand forecasts extrapolate these trends into 1988.

VENTURE CAPITAL

The repercussions of the stock market crash extended into the venture capital industry. Later stage portfolio companies that were preparing for an initial public offering have experienced major valuation declines and will likely consider other methods of financing. Conversely, venture capitalists that have funds available for new investments may find that lower valuation levels have increased the attractiveness of new commitments.

RESOURCE FUNDS

During the fourth quarter of 1987, oil markets focused on the December meeting of OPEC ministers in Vienna. The meeting offered no real change in official price levels ($18 per barrel) or production quotas. As a result, oil prices are expected to remain in a $16-$18 per barrel trading range through the first half of 1988.

BASIC RETIREMENT FUNDS

Investment Objectives

The Basic Retirement Funds are composed of the retirement assets for currently working participants in the statewide retirement funds.

The SBI pursues several investment objectives in the management of the Basic Funds' assets. In order of importance, those objectives are:

- To secure the benefits promised public employees covered by the statewide retirement plan.
- To reduce employer/employee contributions and/or increase promised benefits.
- To avoid excessive volatility in portfolio returns over the short-run.

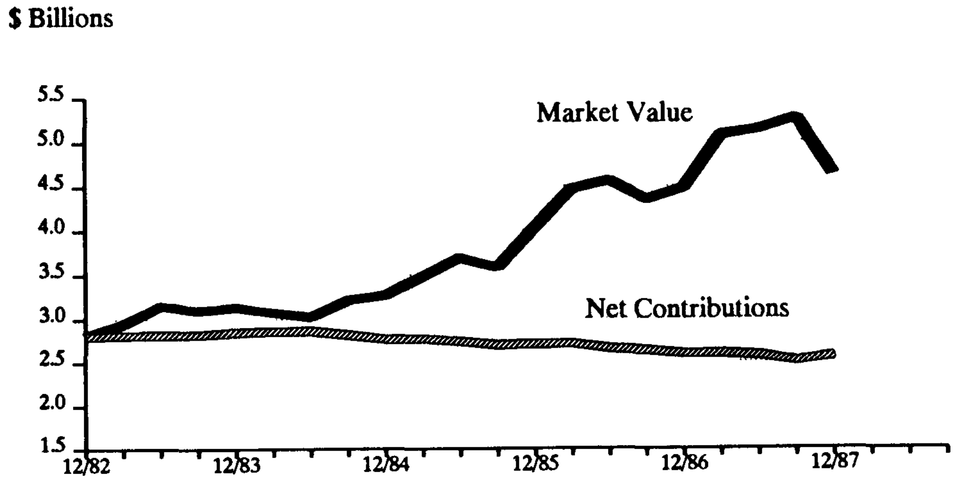
Based upon the Basic Funds' adequate funding levels and participant demographics, its investment time horizon is quite long. This extended time horizon permits the Board to take an aggressive, high expected return investment policy which incorporates a sizable equity component.

The Board is cognizant, however, that excessive short-run return volatility is undesirable. As a result, the investment policy of the Basic Funds also is designed to limit extreme portfolio return results through the inclusion of other asset classes that act as hedges against inflationary and deflationary environments.

Asset Growth

The market value of the Basic Retirement Funds' assets decreased 12.1% during the fourth quarter. The decrease was attributable to October's sharp drop in the stock market. The Basic Funds benefited from portfolio diversification during the quarter. Positive performances by the Basic Funds' other asset segments mitigated the negative impact of common stocks on the Basic Funds' ending market value. The Basic Funds received net contributions of $57 million during the quarter.

Despite the severe fourth quarter decline, the common stock market generated a positive performance for the latest year. With modest positive returns from all its asset classes, the Basic Funds experienced a 3.4% increase in market value for the year despite net withdrawals of $26 million.



In Millions

	12/83	12/84	12/85	12/86	12/87
Beginning Value	$2,806	$3,129	$3,265	$4,030	$4,474
Net Contributions	40	-78	-62	-113	-26
Investment Return	283	214	827	557	180
Ending Value	$3,129	$3,265	$4,030	$4,474	$4,628

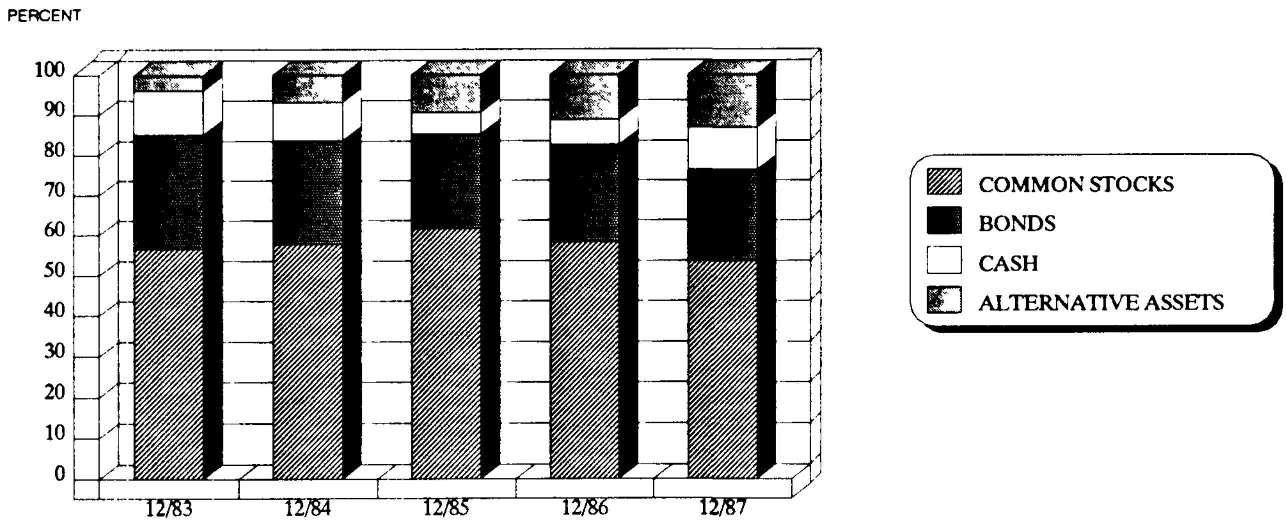
BASIC RETIREMENT FUNDS

Asset Mix

Based on the Basic Funds' investment objectives and the expected long-run performance of the capital markets, the Board has adopted the following long term policy asset allocation for the Basic Funds:

Common Stocks	60.0%
Bonds	22.0
Cash Equivalents	3.0
Real Estate	10.0
Venture Capital	2.5
Resource Funds	2.5

The Basic Funds' asset mix changed significantly during the fourth quarter. A decrease in the stock segment weighting and a concomitant increase in the bond weighting occurred as a result of the widely divergent performances of the common stock and bond markets. The cash segment was temporarily overweighted due to the receipt of a large contribution at the quarter's-end. The alternative investment segment weighting was essentially unchanged.



Last Five Years

	12/83	12/84	12/85	12/86	12/87
Stocks	56.7%	57.8%	61.6%	58.3%	53.6%
Bonds	28.5	25.9	23.8	24.3	22.6
Cash*	10.9	9.4	5.1	6.2	10.6
Real Estate	3.2	5.5	7.1	8.2	9.3
Venture Capital	0.0	0.7	1.2	1.6	2.5
Resource Funds	0.7	0.7	1.2	1.4	1.4
Total	100.0%	100.0%	100.0%	100.0%	100.0%

*Includes cash uncommitted to long-term assets plus all cash held by all external managers.

BASIC RETIREMENT FUNDS

Total Fund Performance vs. Standards

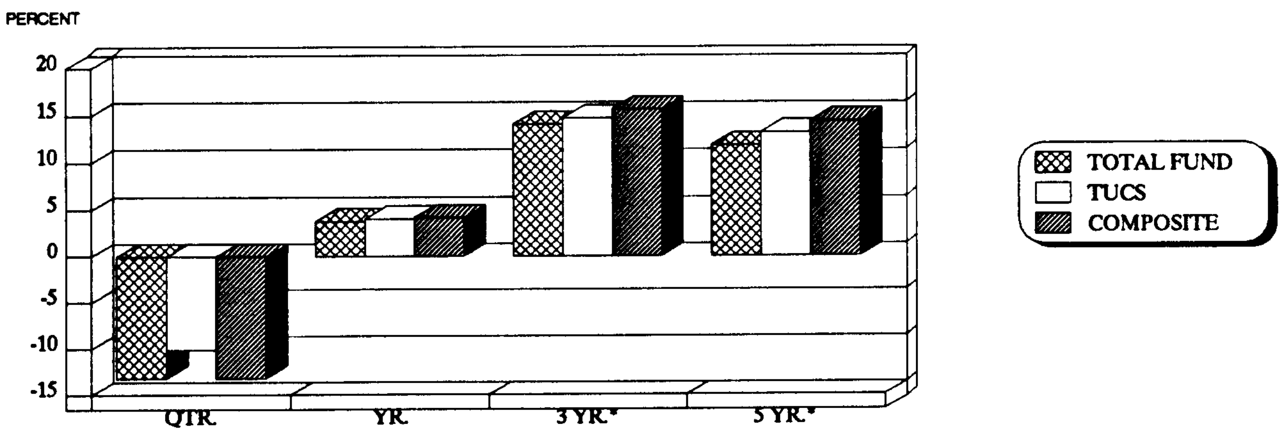
The Basic Funds' long-term rate of return performance is evaluated relative to two specific benchmarks:

- **Composite Index.** The returns provided by the total portfolio are expected to exceed those derived from a composite of market indices, weighted in the same proportion as the Basic Funds' policy asset allocation. Because comprehensive data is available for only the stock, bond and cash equivalents markets, the composite index is weighted 65% stocks, 30% bonds, 5% cash equivalents.

- **Median Tax-Exempt Fund.** The Basic Funds' portfolio is expected to outperform the median return produced by a representative sample of other public and private tax-exempt balanced funds. The sample universe used by the Board is the Wilshire Associates Trust Universe Comparison Service (TUCS). TUCS data reflects the investment returns of over 800 public and private pension investors.

The policy asset mix of the Basic Funds is based on the superior performance of common stocks over the history of the capital markets. The asset mix is designed to add value to the Basic Funds' over their long-term investment time horizon. In the short-run, the Basic Funds can be expected to outperform the median balanced portfolio during periods of positive relative stock performance and underperform during periods of negative stock performance.

The Basic Funds' total portfolio underperformed its assigned performance standards for the most recent quarter and year. As would be expected from its policy asset mix, the Basic Funds' lagged the median balanced portfolio performance during the fourth quarter. The weak relative performance was due to the Basic Funds' sizable stock allocation in a disastrous environment for common stocks. As a result of the fourth quarter performance, the Basic Funds' trailed the median balanced portfolio for the year as well.



	Period Ending 12/31/87			
			*(Annualized)	
	Qtr.	Yr.	3 Yr.	5 Yr.
Total Fund	-13.2%	3.8%	14.1%	11.8%
Total Fund WithoutAlternative Assets	-15.0	3.2	14.8	12.2
TUCS Median Balanced Fund	-10.1	4.1	14.7	13.2
Stock/Bond/Cash Composite	-13.2	4.2	15.6	14.4

BASIC RETIREMENT FUNDS

Segment Performance vs. Standards

Stock Segment

The Basic Funds' common stock segment outperformed its performance target for the latest quarter and year. The slight outperformance was attributable to the active stock managers, who held a portion of their portfolios in cash reserves during the sharp downturn in the stock market.

			Annualized	
	Qtr.	Yr.	3 Yrs.	5 Yrs.
Stock Segment	-22.5%	2.6%	15.8%	12.4%
Wilshire 5000	-23.1	2.3	16.3	14.9

Bond Segment

The bond segment of the Basic Funds trailed the performance of its target for the quarter but exceeded its target for the latest year. The bond managers assumed a defensive posture during the third quarter, shortening the durations of their portfolios slightly as interest rates increased. When the bond market rose sharply in response to the fourth quarter stock market crash, the shorter durations resulted in minor underperformance. Strong performance in the previous quarters allowed the managers to exceed the target's performance for the year.

			Annualized	
	Qtr.	Yr.	3 Yrs.	5 Yrs.
Bond Segment	5.2%	2.8%	12.8%	12.5%
Salomon Bond Index	5.8	2.6	13.1	12.5

Cash Segment

The cash segment of the Basic Funds exceeded its target for the quarter and year.

			Annualized	
	Qtr.	Yr.	3 Yrs.	5 Yrs.
Cash Segment	1.8%	6.9%	7.4%	7.7%
91 Day T-Bills	1.5	5.9	6.7	7.9

Alternative Assets Segment

Comprehensive data on returns provided by the real estate, resource and venture capital markets are not available at this time. Therefore, performance standards for the alternative investment segment have not been established. Returns from the alternative asset segment are shown in the table.

			Annualized	
	Qtr.	Yr.	3 Yrs.	5 Yrs.
Alternative Assets	2.0%	7.7%	5.6%	7.2%

BASIC RETIREMENT FUNDS

Stock Manager Performance vs. Benchmarks

Common stock manager returns are evaluated against the performance of customized indices constructed to represent the managers' specific investment approaches. These custom indices are commonly referred to as "benchmark portfolios." The benchmark portfolios take into account the equity market forces that at times favorably or unfavorably impact certain investment styles. Thus, benchmark portfolios are the appropriate bogeys against which to judge the managers' performances.

Manager performance relative to benchmarks is evaluated on a quarterly basis by the Equity Manager Committee of the Investment Advisory Council.

As a group, the common stock managers essentially matched the performance of their aggregate benchmark for the latest quarter and year. The performance of the individual stock managers was varied. Several exceeded the performance of their targets by comfortable margins, while others continued to trail their targets. A comprehensive analysis of the individual managers' performances is included in this quarter's Equity Committee Report.

Managers	Market Value 12/31/87 (Thousands)	Quarter Ending 12/31/87 Actual	Quarter Ending 12/31/87 Bmrk	Year Ending 12/31/87 Actual	Year Ending 12/31/87 Bmrk	(Annualized) Since 1/1/84 Actual	(Annualized) Since 1/1/84 Bmrk
Alger	$ 84,456	-24.2%	-24.6%	-2.7%	2.8%	10.1%	11.2%
Alliance	100,391	-21.4	-24.2	16.0	1.0	17.6	10.2
Beutel	94,026	-23.4	-23.5	3.0	2.9	10.5	13.8
BMI	50,881	-30.2	-25.3	-8.3	-2.9	4.5	8.1
Forstmann	81,706	-17.6	-16.2	8.8	3.7	14.7	12.1
Hellman	71,015	-21.9	-20.8	7.2	4.3	13.7	13.2
IDS	82,531	-20.7	-19.5	6.7	5.4	15.8	13.5
IAI	80,014	-15.2	-18.9	14.9	6.5	14.6	13.8
Lieber	31,999	-23.0	-24.9	-6.5	-5.7	9.5	7.6
Peregrine	73,744	-20.8	-21.6	-2.1	0.7	N.A.	N.A.
Waddell	85,799	-20.8	-21.3	5.5	5.9	10.5	8.9
Internal	95,831	-24.3	-21.6	-3.4	6.2	N.A.	N.A.
Wilshire	1,690,614	-23.0	-22.8	1.9	2.4	12.7	12.8
Stock Segment	$2,623,007	-22.6%	-22.4%	2.6%	2.4%	12.4%	12.6%
Wilshire 5000		-23.1%		2.3%		12.9%	

BASIC RETIREMENT FUNDS

Bond Manager Performance vs. Benchmarks

Staff is in the process of working with the Board's bond managers to develop appropriate benchmark portfolios. Three of the six managers have completed their benchmark portfolios. Returns for these portfolios are reported below. For the remaining three managers, the benchmark portfolio currently in use is the Salomon Broad Investment Grade Bond Index, which represents the performance of essentially the entire investment-grade bond market, plus a small allocation to cash equivalents.

Manager performance relative to benchmarks is evaluated on a quarterly basis by the Fixed Income Manager Committee of the Investment Advisory Council.

Of the six active bond managers, only Miller, Anderson, Sherrerd managed to exceed the performance of the broad bond market in fourth quarter 1987. Most of the managers had defensively shortened the average lives of their portfolios during the difficult third quarter environment. When the bond market rose sharply in October in response to the sudden stock market crash, the managers were not positioned to participate fully in the rally. As a group, the bond managers trailed the performance of the market by a slight margin. Despite the fourth quarter results, strong performance by the bond managers in the most recent quarters allowed the group to exceed the market's performance for the latest year.

Managers	Market Value 12/31/87 (Thousands)	Quarter Ending 12/31/87 Actual	Quarter Ending 12/31/87 Bmrk	Year Ending 12/31/87 Actual	Year Ending 12/31/87 Bmrk	(Annualized) Since 6/1/84 Actual	(Annualized) Since 6/1/84 Bmrk
IAI	$ 43,186	5.1%	5.6%	3.1%	2.8%	16.5%	15.6%
Lehman	242,395	5.3	5.2	2.6	2.9	14.8	15.7
Miller	254,283	6.3	5.6	3.7	2.8	16.3	15.6
Morgan	207,146	4.8	5.6	4.0	2.8	15.7	15.6
Peregrine	115,181	3.6	5.4	3.1	3.2	13.1	15.8
Western	258,507	5.3	5.5	1.1	2.5	16.9	15.5
Bond Segment	$1,120,697	5.2%	5.5%	2.8%	2.8%	15.7%	15.6%
Salomon Bond Index		5.8%		2.6%		16.2%	

POST RETIREMENT FUND

Investment Objectives

The Post Retirement Investment Fund contains the pension assets of retired public employees covered by statewide retirement plans.

Upon the employees' retirement, sums of money sufficient to finance fixed monthly annuities are transferred from accumulation pools in the Basic Funds to the Post Fund. In order to support promised benefits, the Post Fund must "earn" at least 5% on its invested assets each year. If the Post Fund exceeds this earnings rate, excess earnings are used to finance permanent benefit increases for eligible retirees.

The SBI pursues two investment goals for the Post Fund:

- To produce annual earnings sufficient to maintain promised benefits at current levels
- To generate additional earnings which allow benefits to be increased at a rate which compensates, to some degree, for inflation

To achieve these two objectives, the SBI recognizes that the Post Fund requires a completely different investment approach than that applied to the Basic Retirement Funds.

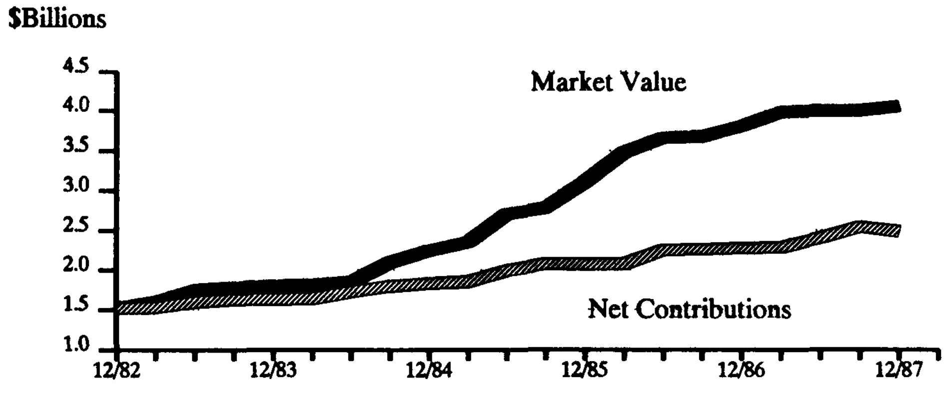
The Post Fund is not oriented toward long-term total rate of return maximization. Rather, the SBI attempts to generate a high, consistent stream of earnings for the Post Fund that will maintain current benefits, as well as produce benefit increases over time.

Asset Growth

The market value of the Post Fund increased by 1.4% during fourth quarter 1987. The modest asset growth occurred despite net withdrawals from the Fund of over $62 million. The Post Fund was aided during the period by its sizable exposure to bonds which, unlike stocks, generated a positive performance.

For the most recent year, the market value of the Post Fund's assets grew by 6.3%. The growth was the result of net contributions ($207 million) and investment performance.

During the last several years, the Post Fund has received large positive contributions due to the "Rule of 85". Now that early retirement provisions have expired, the contributions are expected to diminish.



In Millions

	12/83	12/84	12/85	12/86	12/87
Beginning Value	$1,523	$1,803	$2,246	$3,107	$3,808
Net Contributions	109	201	239	199	207
Investment Return	171	242	622	502	32
Ending Value	$1,803	$2,246	$3,107	$3,808	$4,047

POST RETIREMENT FUND

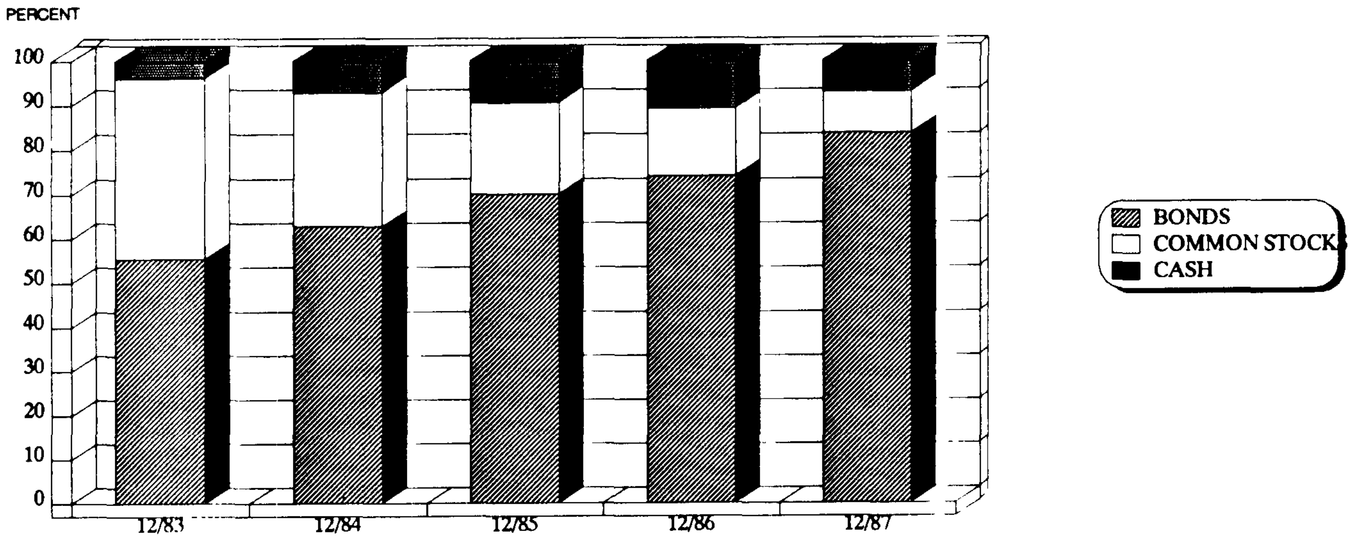
Asset Mix

The Board has designed the asset mix of the Post Fund to generate the sizable stable earnings stream necessary to finance monthly payments to retirees.

The SBI invests the majority of the Post Fund's assets in a dedicated bond portfolio. A dedicated bond portfolio is a collection of various maturity, high-quality bonds which generate cash flows from income and principal payments that match a specific stream of liabilities.

Assets not committed to the dedicated bond portfolio are generally invested in common stocks and cash equivalents.

The common stock segment of the Post Fund was reduced in size during the fourth quarter. Some stocks were sold from the portfolio in anticipation of the dedicated bond portfolio rebalancing scheduled for first quarter 1988. As a result, the cash segment of the Fund grew in size as stock proceeds were temporarily placed in cash equivalents. The size of the dedicated bond portfolio will increase in first quarter 1988 to accomodate additional liabilities generated by an increase in new retirees.



Last Five Years

	12/83	12/84	12/85	12/86	12/87
Bonds	55.6	62.9	70.2	74.2	83.7
Stocks	40.5	30.0	20.5	15.1	9.3
Cash	3.9	7.1	9.3	10.7	7.0
Total	100.0%	100.0%	100.0%	100.0%	100.0%

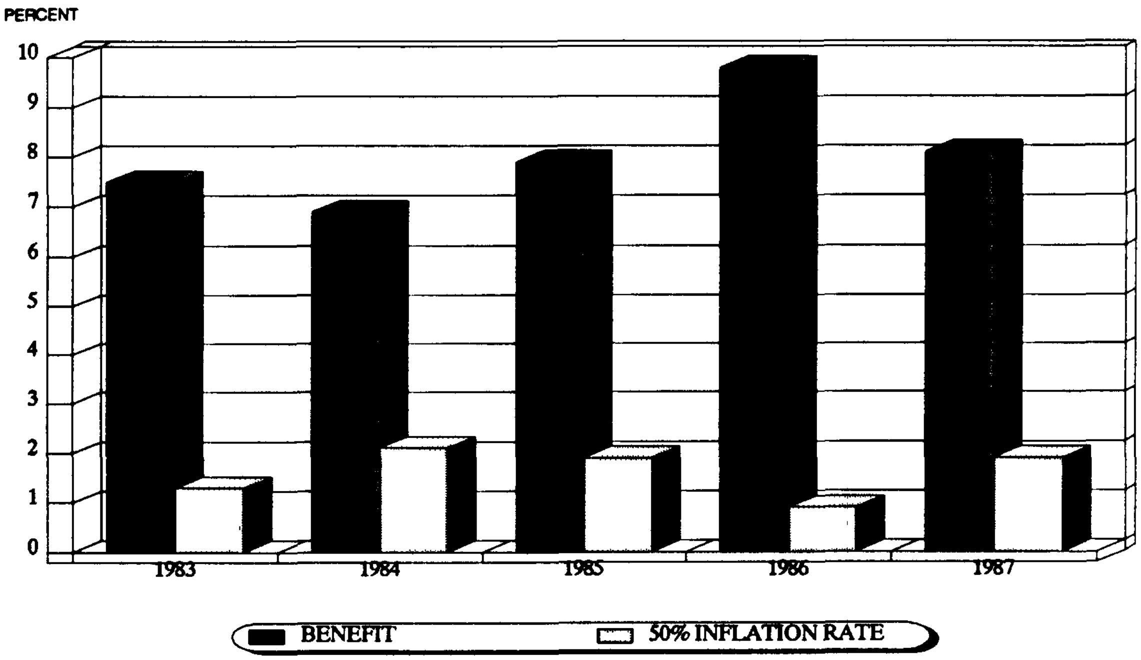
POST RETIREMENT FUND

Total Fund Performance

The ability of the Post Fund to maintain current benefit levels and provide future benefit increases depends upon its earnings. State statutes define earnings for the Post Fund as interest and dividend income as well as realized equity and fixed income capital gains (or losses). Unrealized capital gains (or losses) have no direct impact on the benefits paid out to retirees. Unrealized capital gains (or losses) are excluded from defined earnings in order to make benefit payments largely insensitive to near-term fluctuations in the capital markets.

Assets committed to the dedicated bond portfolio ensure that all existing promised benefits will be paid to current retirees. Excess investment earnings on the Post Fund assets are used to finance permanent lifetime benefit increases for retirees. Benefit increases generated over the last five years are shown below.

Benefit Increases Compared to Inflation



Fiscal Year

	1983	1984	1985	1986	1987	(Annualized) 3 Yrs.	5 Yrs.
Benefit Increases	7.5%	6.9%	7.9%	9.8%	8.1%	8.6%	8.0%
50% of Inflation	1.3	2.1	1.9	0.9	1.9	1.6	1.6

POST RETIREMENT FUND

Segment Performance

Stock Segment Performance

The stock segment underperformed its target for the quarter and the year. The performance of the portfolio was negatively impacted by its substantial overweighting of the finance sector of the market.

	Period Ending 12/31/87			
			(Annualized)	
	Qtr.	Yr.	3 Yrs.	5 Yrs.
Stock Segment	-23.8%	-4.0%	8.4%	9.4%
Wilshire 5000	-23.1	2.3	16.3	14.9

Bond Segment Performance

The composition of the Post Retirement Investment Fund's dedicated bond portfolio was essentially unchanged during the quarter.

The Post Fund's bond portfolio provided a 7.6% rate of return for the quarter and a -0.3% return for the year. This performance is consistent with the bond portfolio's design. The Post Fund's dedicated bond portfolio is structured so that portfolio income and maturities match the Fund's liability stream. As a result, the duration of the dedicated bond portfolio exceeds that of the bond market. Consequently, on a total return basis, the portfolio can be expected to underperform the bond market in down periods and outperform the market in up periods.

Dedicated Bond Portfolio Statistics
12/31/87

Value at Market	$ 2,503,579,980
Value at Cost	2,349,326,194
Average Coupon	7.00%
Current Yield	9.10
Yield to Maturity	9.17
Current Yield at Cost	9.70
Time to Maturity	14.79 Years
Average Duration	6.87 Years
Average Quality Rating	AAA
Number of Issues	268

MINNESOTA STATE BOARD OF INVESTMENT

SUPPLEMENTAL INVESTMENT FUND

- INCOME SHARE ACCOUNT
- GROWTH SHARE ACCOUNT
- COMMON STOCK INDEX ACCOUNT
- BOND MARKET ACCOUNT
- MONEY MARKET ACCOUNT
- GUARANTEED RETURN ACCOUNT
- BOND ACCOUNT

QUARTERLY INVESTMENT REVIEW

DECEMBER 31, 1987

MINNESOTA STATE BOARD OF INVESTMENT

SUPPLEMENTAL INVESTMENT FUND

FOURTH QUARTER 1987

Summary

The Minnesota Supplemental Investment Fund is a multi-purpose investment program that offers a range of investment options to state and local public employees. The different participating groups use the Fund for a variety of purposes:

- It functions as the investment manager for all assets of the Unclassified Employees Retirement Plan.
- It acts as the investment manager for all assets of the supplemental retirement programs for state university and community college teachers and for Hennepin County Employees.
- It is one investment vehicle offered to public employees as part of the state's Deferred Compensation Plan.
- It serves as an external money manager for a portion of some local police and firefighter retirement plans.

The Supplemental Investment Fund serves more than 14,000 individuals. On December 31, 1987 the market value of the entire fund was $364 million.

A wide diversity of investment goals exists among the Fund's participants. In order to meet those needs, the Fund has been structured much like a "family of mutual funds." Participants may allocate their investments among one or more accounts that are appropriate for their needs, within the statutory requirements and rules established by the participating organizations. Participation in the Fund is accomplished through the purchase or sale of shares in each account.

As of the beginning of fiscal year 1987, participants in the Supplemental Investment Fund may select from among the following seven investment options:

- Income Share Account - an actively managed, balanced portfolio utilizing both common stocks and bonds.

- o Growth Share Account - an actively managed, all common stock portfolio.

- o Common Stock Index Account - a passively managed, all common stock portfolio designed to track the performance of the entire stock market.

- o Bond Market Account - an actively managed, all bond portfolio.

- o Money Market Account - a portfolio utilizing short term, liquid debt securities.

- o Guaranteed Return Account - an option utilizing guaranteed investment contracts (GIC's), which offer a fixed rate of return for a specified period of time.

- o Bond Account - a portfolio of intermediate term debt securities that are bought and held to maturity. This option is available only to local police and firefighter retirement plans. There are currently no participants in this account.

SUPPLEMENTAL INVESTMENT FUND

INCOME SHARE ACCOUNT

The primary investment objective of the Income Share Account is similar to that of the Basic Retirement Funds. The Account seeks to maximize long-term real rates of return, while limiting short-run portfolio return volatility.

To achieve this objective, the Income Share Account is invested in a balanced portfolio of common stocks and fixed income securities. The Account's target long-term asset allocation is 60% common stocks, 35% bonds, and 5% cash equivalents. Common stocks provide the potential for significant capital appreciation, while bonds provide a deflation hedge and portfolio diversification.

The investment management structure of the Income Share Account combines internal and external management. The SBI investment staff manages the entire fixed income segment of the Account's portfolio and approximately 25% of the common stock segment. The balance of the common stock portfolio is managed externally. The Account participates in the passive component of the common stock segment of the Combined Investment Funds.

The December 31, 1987 market value of the Income Share Account was $195 million.

The Income Share Account's asset mix for the last five calendar years is presented on pages 18 and 19.

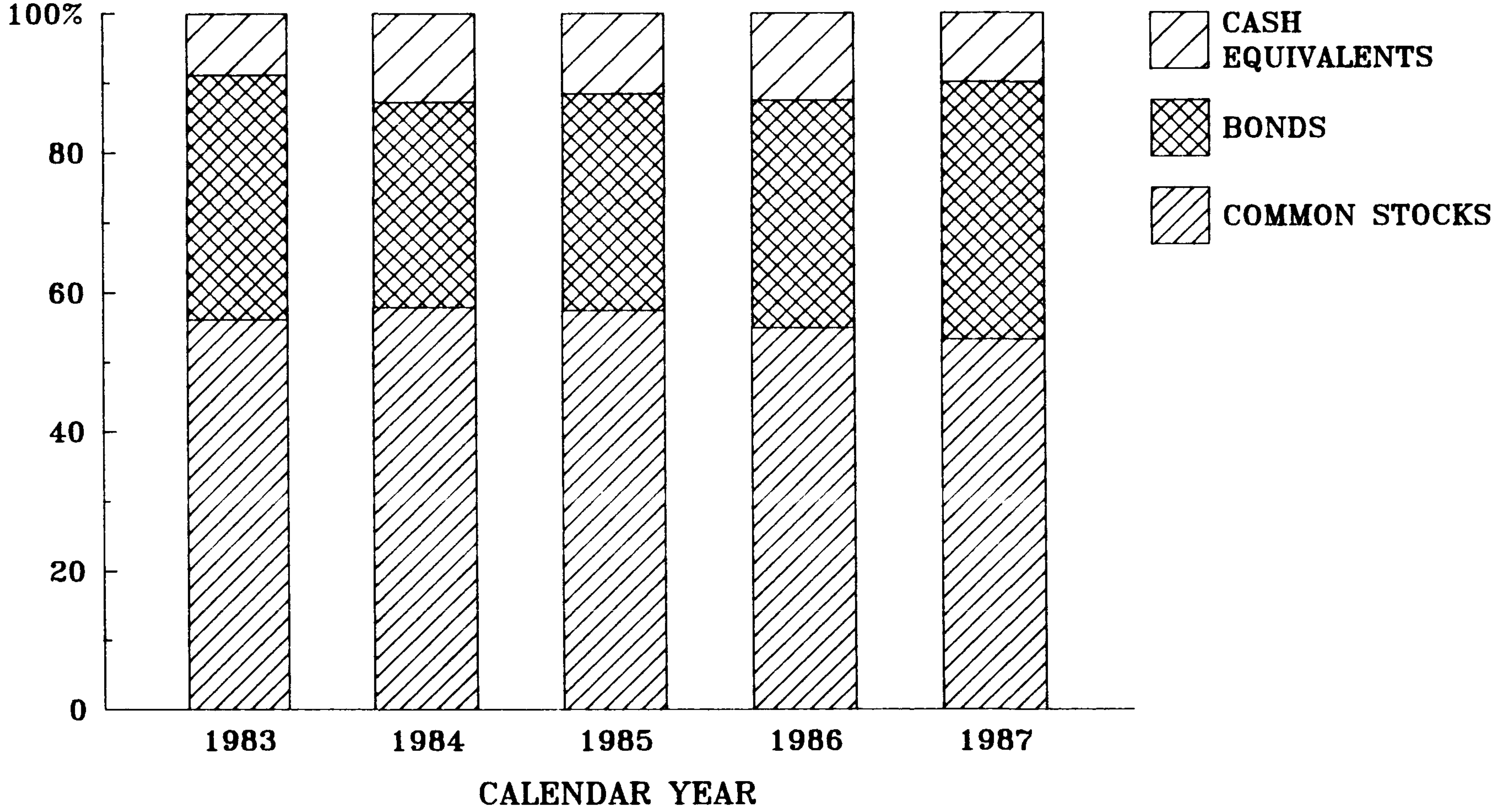
Total account and asset segment performance is displayed on page 20. Individual external manager performance is presented on page 7.

FIGURE 1

SUPPLEMENTAL INVESTMENT FUND

(INCOME SHARE ACCOUNT)

HISTORICAL ASSET MIX



PERCENT OF MARKET VALUE
END OF PERIOD ALLOCATIONS

TABLE 1

SUPPLEMENTAL INVESTMENT FUND
(Income Share Account)
ASSET MIX

PERCENT OF MARKET VALUE
(End Of Period Allocations)

Calendar Year		Common Stocks $Million	Common Stocks Percent	Bonds $Million	Bonds Percent	Cash* $Million	Cash* Percent
1983		63.5	56.2	39.6	35.0	9.9	8.8
1984		74.4	58.0	37.6	29.3	16.4	12.7
1985		92.8	57.5	50.0	31.0	18.5	11.5
1986		101.9	55.0	60.2	32.5	23.1	12.5
1987	1Q	123.8	59.2	58.4	27.9	27.1	12.9
	2Q	127.8	59.7	59.1	27.6	27.3	12.7
	3Q	135.5	61.3	72.9	33.0	12.7	5.7
	4Q	103.9	53.3	71.7	36.8	19.3	9.9

*Includes cash held by the external managers

TABLE 2

SUPPLEMENTAL INVESTMENT FUND

INCOME SHARE ACCOUNT

INVESTMENT PERFORMANCE

Total Returns

	FOURTH QUARTER 1987	YEAR ENDING 12/31/87
Total Account	-12.1%	3.6%
Median Fund*	-10.1	4.1
Composite**	-11.7	4.3
Equity Segment	-22.9	0.8
Wilshire 5000	-23.1	2.3
Bond Segment	5.9	5.8
Salomon Broad Bond Index	5.8	2.6

* TUCS Median Balanced Portfolio

** 50/45/5 Wilshire 5000/Salomon Broad Bond Index/T-Bills Composite Through 12-31-82; 60/35/5 Composite Thereafter

SUPPLEMENTAL INVESTMENT FUND

GROWTH SHARE ACCOUNT

The Growth Share Account's principal investment objective is to generate above-average returns from capital appreciation. In order to attain this objective, the Growth Share Account's investment program focuses on common stocks. The long-run target asset allocation for the Account is 95% common stock, 5% cash equivalents. The small cash equivalents component represents the normal cash reserves held by the Account as a result of net contributions not yet allocated to stocks.

The SBI investment staff manages approximately one-third of the common stock portfolio; the balance is managed externally. The Growth Share Account's external equity component is achieved through its participation in the active common stock segment of the Board's Combined Investment Funds. The SBI investment staff manages the internal component of the equity portfolio with a long-term value-oriented approach. This approach is complemented by the external managers' more aggressive posture.

The December 31, 1987 market value of the Growth Share Account was $75 million.

The historical asset mix for the account is displayed on pages 22 and 23.

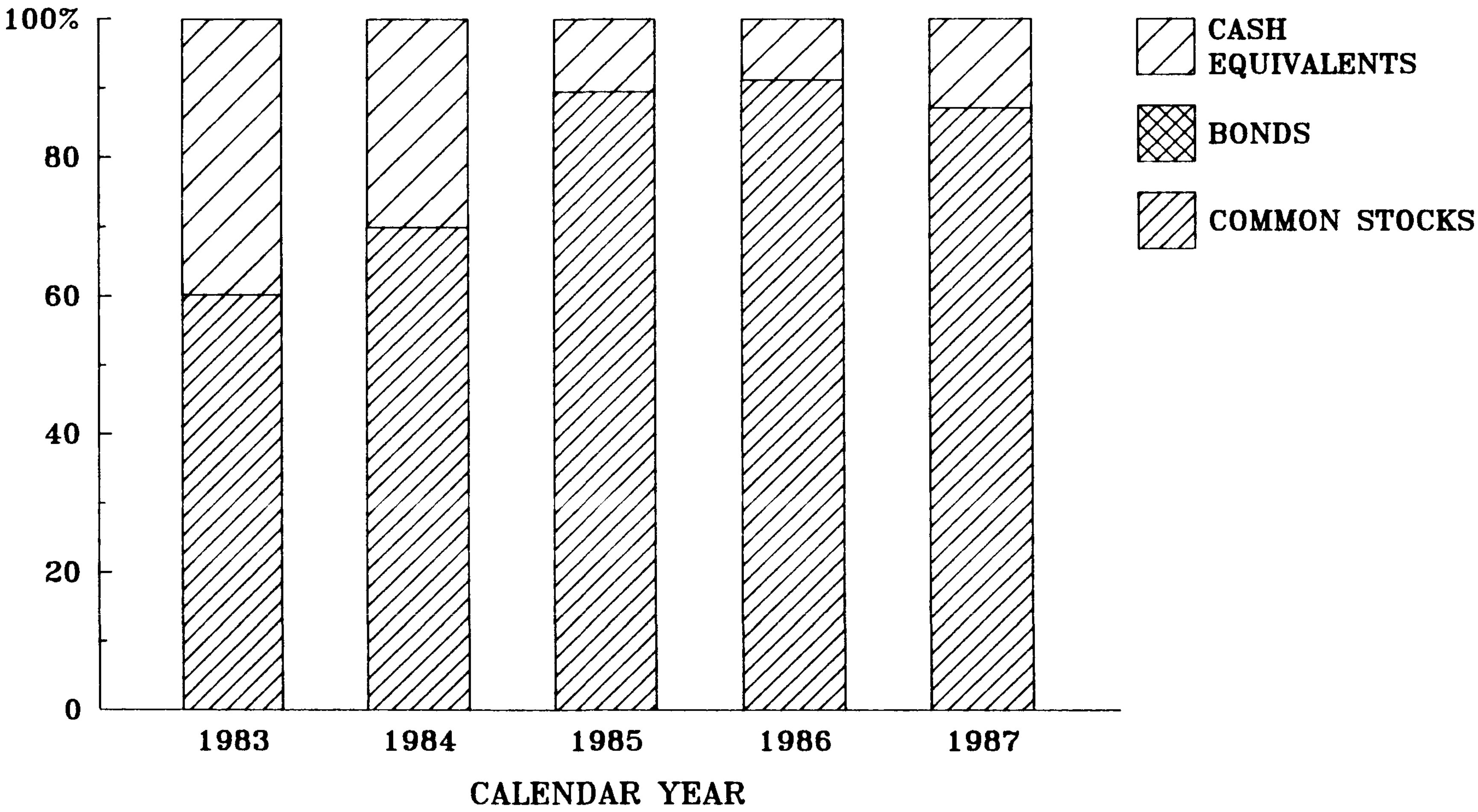
Total account and asset segment performance is presented on page 24. Individual common stock manager performance is listed on page 7.

FIGURE 2

SUPPLEMENTAL INVESTMENT FUND

(GROWTH SHARE ACCOUNT)

HISTORICAL ASSET MIX



PERCENT OF MARKET VALUE
END OF PERIOD ALLOCATIONS

TABLE 3

SUPPLEMENTAL INVESTMENT FUND
(Growth Share Account)

ASSET MIX

PERCENT OF MARKET VALUE
(End Of Period Allocations)

Calendar Year		Common Stocks		Bonds		Cash*	
		$Million	Percent	$Million	Percent	$Million	Percent
1983		33.7	60.3	----	----	22.2	39.7
1984		41.8	70.0	----	----	17.9	30.0
1985		65.8	89.5	----	----	7.7	10.5
1986		68.5	91.2	----	----	6.6	8.8
1987	1Q	81.6	90.7	----	----	8.3	9.3
	2Q	83.1	91.8	----	----	7.4	8.2
	3Q	86.5	90.8	----	----	8.8	9.2
	4Q	65.0	87.1	----	----	9.6	12.9

*Includes cash held by the external managers

TABLE 4

SUPPLEMENTAL INVESTMENT FUND

GROWTH SHARE ACCOUNT

INVESTMENT PERFORMANCE

	Total Returns	
	FOURTH QUARTER 1987	YEAR ENDING 12/31/87
Total Account	-21.9%	1.9%
Median Fund*	-21.2	3.6
Composite**	-21.8	2.7
Equity Segment	-22.0	2.1
Wilshire 5000	-23.1	2.3

* TUCS Median Managed Equity Portfolio

** 95/5 Wilshire 5000/T-Bills Composite

SUPPLEMENTAL INVESTMENT FUND

COMMON STOCK INDEX ACCOUNT

The Common Stock Index Account is a new investment option for the participants in the Supplemental Investment Fund. The Index Account accepted contributions effective July 1, 1986. The December 31, 1987 market value of the Account was $2,353,895.

The investment objective of the Common Stock Index Account is to generate returns that match those of the common stock market. This objective is achieved through the Account's participation in the SBI's existing index fund.

The SBI's index fund is a passively-managed portfolio of over 1,300 different stocks. The fund is designed to track the performance of the Wilshire 5000, a broad-based equity market indicator. The Wilshire 5000 represents virtually the entire domestic common stock market.

The performance of the Supplemental Common Stock Index Account is presented below. Performance from third quarter 1986 on reflects the returns earned by the newly created Index Account. Performance data prior to third quarter 1986 represents what the performance of the Common Stock Index Account would have been had it participated in the index fund during the time periods indicated.

Total Returns

CALENDAR YEAR	SUPPLEMENTAL COMMON STOCK INDEX ACCOUNT	WILSHIRE 5000
1985	32.5%	32.6%
1986	16.0	16.1
1987 1Q	20.7	21.2
2Q	3.6	3.3
3Q	6.0	6.2
4Q	-23.1	-23.1
1 Year Ending 12/31/87	2.0	2.3
2 Years Annualized Ending 12/31/87	8.7	9.0

SUPPLEMENTAL INVESTMENT FUND

BOND MARKET ACCOUNT

The Bond Market Account is another new investment option for the participants in the Supplemental Investment Fund. The Account accepted contributions effective July 1, 1986. The December 31, 1987 market value of the Account was $634,481.

The investment objective of the Bond Market Account is to earn a high rate of return by investing in fixed income securities. Account returns are generated in the form of interest income and capital appreciation. The Account invests primarily in high-quality, government and corporate bonds that have intermediate to long-term maturities, usually 3 to 20 years.

The entire Bond Market Account is invested externally. The Account participates in the bond component of the Combined Investment Funds. Through this participation, the Account uses the same six external bond managers as the Basic Retirement Funds.

The Board funded the external bond managers in early July, 1984. The six managers were selected for their blend of investment styles. Each of the managers emphasizes active investment decisions. However, the managers vary in their approach to interest rate anticipation, issue selection, and bond market sector weighting.

Performance of the Supplemental Bond Market Account is displayed below. Individual manager performance is presented on page 8.

As with the Common Stock Index Account, performance from third quarter 1986 on reflects the returns earned by the new Bond Market Account. The performance prior to third quarter 1986 represents what the performance of the Bond Market Account would have been had the account participated in the bond component of the Combined Investment Funds during the periods indicated.

Total Returns

CALENDAR YEAR		SUPPLEMENTAL BOND MARKET ACCOUNT	SALOMON BROAD BOND INDEX
1985		21.7%	22.3%
1986		15.4	15.5
1987	1Q	2.3	1.3
	2Q	- 2.3	- 1.6
	3Q	- 2.2	- 2.8
	4Q	5.3	5.8
1 Year Ending 12/31/87		2.9	2.6
2 Years Annualized Ending 12/31/87		8.9	8.8

SUPPLEMENTAL INVESTMENT FUND

MONEY MARKET ACCOUNT

The Money Market Account is essentially a new option for participants in the Supplemental Investment Fund. The Account was formerly called the Fixed Return Account. However, its name has been changed to more accurately reflect its new investment focus. The December 31, 1987 market value of the Account was $71 million.

The investment objective of the Money Market Account is to purchase short-term, liquid fixed income investments that pay interest at rates competitive with those available in the money markets.

The Money Market Account is invested entirely in high quality short-term investments such as U.S. Treasury Bills, bank certificates of deposit, repurchase agreements, and high grade commercial paper. The maximum maturity of these investments is three years.

The Money Market Account is managed solely by State Street Bank and Trust Company of Boston, MA. State Street manages a major portion of the Board's cash reserves.

Fourth quarter 1986 was the first full quarter of performance for the Money Market Account under its new focus. The historical performance from previous periods for State Street's short-term account represents the investment returns that would have been generated by the Money Market Account had it been invested under the current approach.

Total Returns
(Annualized)

CALENDAR YEAR		SUPPLEMENTAL MONEY MARKET ACCOUNT	90-DAY TREASURY BILLS
1985		8.2%	7.9%
1986		6.9	6.3
1987	1Q	6.1	5.7
	2Q	6.6	5.7
	3Q	7.0	6.1
	4Q	7.6	6.0
1 Year Ending 12/31/87		6.9	5.9
2 Years Annualized Ending 12/31/87		7.0	6.1

SUPPLEMENTAL INVESTMENT FUND

GUARANTEED RETURN ACCOUNT

The Guaranteed Return Account is a new investment option for participants in the Supplemental Investment Fund. The investment objectives of the Guaranteed Return Account are to protect investors from any loss of their original investment and to provide a fixed rate of return over a three year period.

The Guaranteed Return Account is invested in guaranteed investment contracts (GIC's) offered by major U.S. insurance companies. Each year, the Board will accept bids from insurance companies that meet the financial quality criteria defined by State statute. The insurance company offering the highest three-year GIC interest rate will be awarded the contract. That interest rate will then be offered to participants who make contributions to the Guaranteed Return Account over the following twelve months.

Final bidding on the 1987 GIC contract occurred during October, 1987. Principal Mutual Life Insurance Company (formerly The Bankers Life of Iowa) submitted the winning bid of 8.45%. Principal Mutual was also the winner of the 1986 GIC bidding. The 1986 GIC contract rate was 7.72%.

The Guaranteed Return Account first accepted contributions in November, 1986.

CONTRACT PERIOD	ANNUAL EFFECTIVE RATE	MANAGER
Nov. 1, 1986-Oct. 31, 1989	7.72%	Principal Mutual Life
Nov. 1, 1987-Oct. 31, 1990	8.45%	Principal Mutual Life

SUPPLEMENTAL INVESTMENT FUND

BOND ACCOUNT

The Bond Account was established by the 1981 Legislature to provide a separate fixed return investment vehicle for police and firefighter organizations. Its objective is to generate high levels of current income by investing in high quality debt securities. The Account's sole source of return is the interest income produced by its holdings.

Contributions to the Bond Account are grouped by fiscal year (July 1 to June 30), referred to as a "class year". The established yield for each class year is the weighted average yield on all fixed income securities purchased for that year. This established yield is in effect for the life of the class. If a retirement organization chooses to withdraw contributions from the Bond Account prior to the expiration of the fixed period for the class, its withdrawal will be redeemed at market value. Organizations withdrawing from the Account will not affect the established yield of other participants in the class.

The Bond Account is managed entirely by Investment Board staff. Since all assets are held to maturity, staff provides very cost-effective management for the Account.

Participation in the Bond Account is structured much like a money market mutual fund. The Account maintains a uniform value of $5.00 per share. Annual income for the Account is determined at the close of each fiscal year (June 30).

Participating organizations may choose to receive their annual income at the close of each fiscal year, or they may elect to use the income to purchase new shares in the upcoming class year.

Returns for the Bond Account for recent years are presented below:

CLASS YEAR	FIXED PERIOD	ESTABLISHED YIELD (ANNUAL)
1983	6 yrs. (1983-88)	11.2%
1984	7 yrs. (1984-90)	13.0%
1985	7 yrs. (1985-91)	11.8%
1986	7 yrs. (1986-92)	10.5%
1987	7 yrs. (1987-93)	9.0%

There are currently no participants in this account.

MINNESOTA STATE BOARD OF INVESTMENT

MINNESOTA VARIABLE ANNUITY FUND

QUARTERLY INVESTMENT REVIEW

DECEMBER 31, 1987

MINNESOTA STATE BOARD OF INVESTMENT

MINNESOTA VARIABLE ANNUITY FUND

FOURTH QUARTER 1987

Summary

The Minnesota Variable Annuity Fund is an investment option formerly offered to members of the Teachers' Retirement Association. The Fund was designed as an alternative to the regular teachers' retirement plan. The opportunity to enroll in the Fund is no longer offered to new Association members, although members enrolled prior to the cutoff date may retain their participation in the Fund and continue to make contributions. The December 31, 1987 market value of the Fund was $141 million.

The investment objective of the Minnesota Variable Annuity Fund is comparable to that of the Supplemental Investment Fund's Growth Share Account. The goal of the Variable Annuity Fund is to generate above-average capital appreciation. Like the Growth Share Account, the Variable Annuity Fund's long-term, policy asset allocation is 95% common stocks, 5% cash equivalents.

Management of the Variable Annuity Fund is split between internal and external management. The SBI staff manages approximately 25% of the common stock portfolio, while the balance is managed externally. The SBI staff provides a conservative value-oriented style of management, while the external managers complement the internal staff with a more aggressive investment approach.

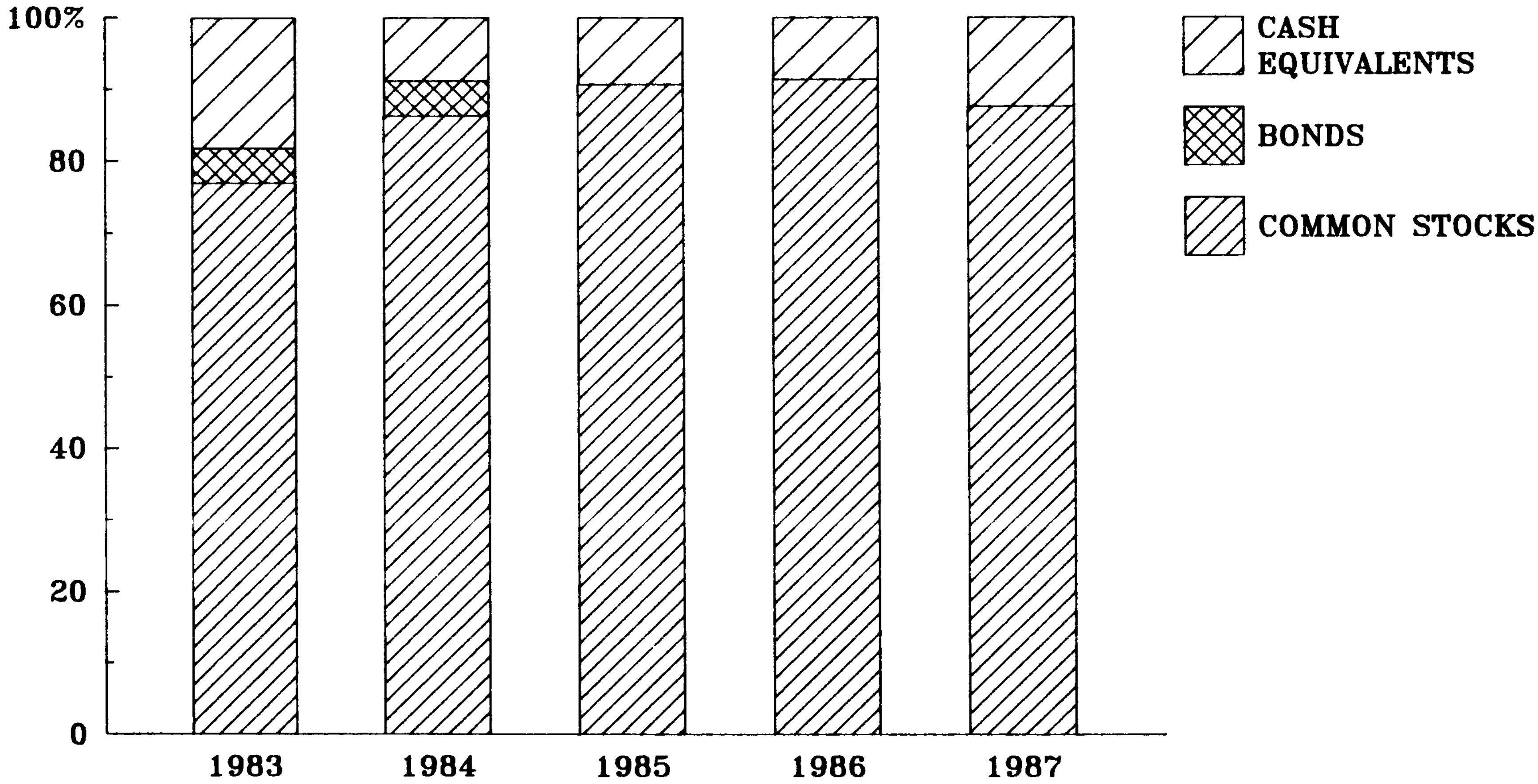
Historical asset allocation for the Minnesota Variable Annuity Fund is presented in the graph on page 34 and the accompanying table on page 35.

Total account and asset segment performance is presented in the table on page 36. Individual common stock managers performance is given on page 7.

FIGURE 3

MINNESOTA VARIABLE ANNUITY FUND

HISTORICAL ASSET MIX



PERCENT OF MARKET VALUE
END OF PERIOD ALLOCATIONS

TABLE 5

MINNESOTA VARIABLE ANNUITY FUND

ASSET MIX

PERCENT OF MARKET VALUE
(End Of Period Allocations)

Calendar Year		Common Stocks		Bonds		Cash*	
		$Million	Percent	$Million	Percent	$Million	Percent
1983		78.9	77.0	5.0	4.8	18.7	18.2
1984		89.4	86.3	5.1	4.9	9.1	8.8
1985		116.8	90.7	---	---	12.0	9.3
1986		127.6	91.4	---	---	12.0	8.6
1987	1Q	152.0	90.6	---	---	15.8	9.4
	2Q	156.6	91.8	---	---	14.0	8.2
	3Q	164.4	91.0	---	---	16.3	9.0
	4Q	123.2	87.6	---	---	17.4	12.4

*Includes cash held by external managers

TABLE 6

MINNESOTA VARIABLE ANNUITY FUND

INVESTMENT PERFORMANCE

	Total Returns	
	FOURTH QUARTER 1987	YEAR ENDING 12/31/87
Total Account	-21.9%	1.9%
Median Fund*	-21.2	3.6
Composite**	-21.8	2.7
Equity Segment	-21.9	2.1
Wilshire 5000	-23.1	2.3

* TUCS Median Managed Equity Portfolio

** 95/5 Wilshire 5000/T-Bills Composite

MINNESOTA STATE BOARD OF INVESTMENT

PERMANENT SCHOOL FUND

QUARTERLY INVESTMENT REVIEW

DECEMBER 31, 1987

MINNESOTA STATE BOARD OF INVESTMENT

PERMANENT SCHOOL FUND

FOURTH QUARTER 1987

Summary

ASSETS

The market value of the Permanent School Fund's assets increased 4.1% during fourth quarter. The increase was attributable solely to the strong performance of the bond market as withdrawals from the Fund exceeded contributions by $15 million. For the most recent year, the market value of the Permanent School Fund's assets decreased 3.2%. The decrease reflects both the weak performance of bonds during the early part of the year and net withdrawals from the Fund of $24 million.

The asset growth of the Permanent School Fund is detailed below.

Calendar Year		Market Value (Millions)	Percent Change From Previous Period
1982		286	+ 21.2
1983		290	+ 1.4
1984		308	+ 6.2
1985		350	+ 13.6
1986		364	+ 4.0
1987	1Q	361	- 0.8
	2Q	361	0.0
	3Q	338	- 6.4
	4Q	352	+ 4.1

ASSET MIX

The asset mix of the Permanent School Fund was essentially unchanged during the quarter. The Permanent School Fund continues to hold only fixed income securities. Under current accounting limitations, common stocks are not appropriate vehicles for the Fund.

The asset mix of the Permanent School Fund for recent periods is presented below.

ASSET MIX

	12/31/86	9/30/87	12/31/87
Common Stocks	0.0%	0.0%	0.0
Bonds	72.0	92.3	93.0
Cash Equivalents	28.0	7.7	7.0
	100.0%	100.0%	100.0%

BOND PORTFOLIO

The composition of the Permanent School Fund's bond portfolio remained the same during the fourth quarter. The bond portfolio is structured with a laddered distribution of maturities to minimize the Fund's exposure to re-investment rate risk. At the quarter's-end, the portfolio had a current yield of 9.4%, an average life of 7.7 years, and a AAA quality rating. The portfolio remains concentrated in Treasury and Agency issues and has a significant mortgage component as well.

TABLE 7

PERMANENT SCHOOL FUND

BOND PORTFOLIO STATISTICS

DECEMBER 31, 1987

Value at Market	$320,996,617
Value at Cost	324,943,434
Average Coupon	9.09%
Current Yield	9.38
Yield to Maturity	9.34
Current Yield at Cost	9.35
Time to Maturity	17.9 Years
Average Duration	7.7 Years
Average Quality Rating	AAA
Number of Issues	127

SECTOR WEIGHTINGS

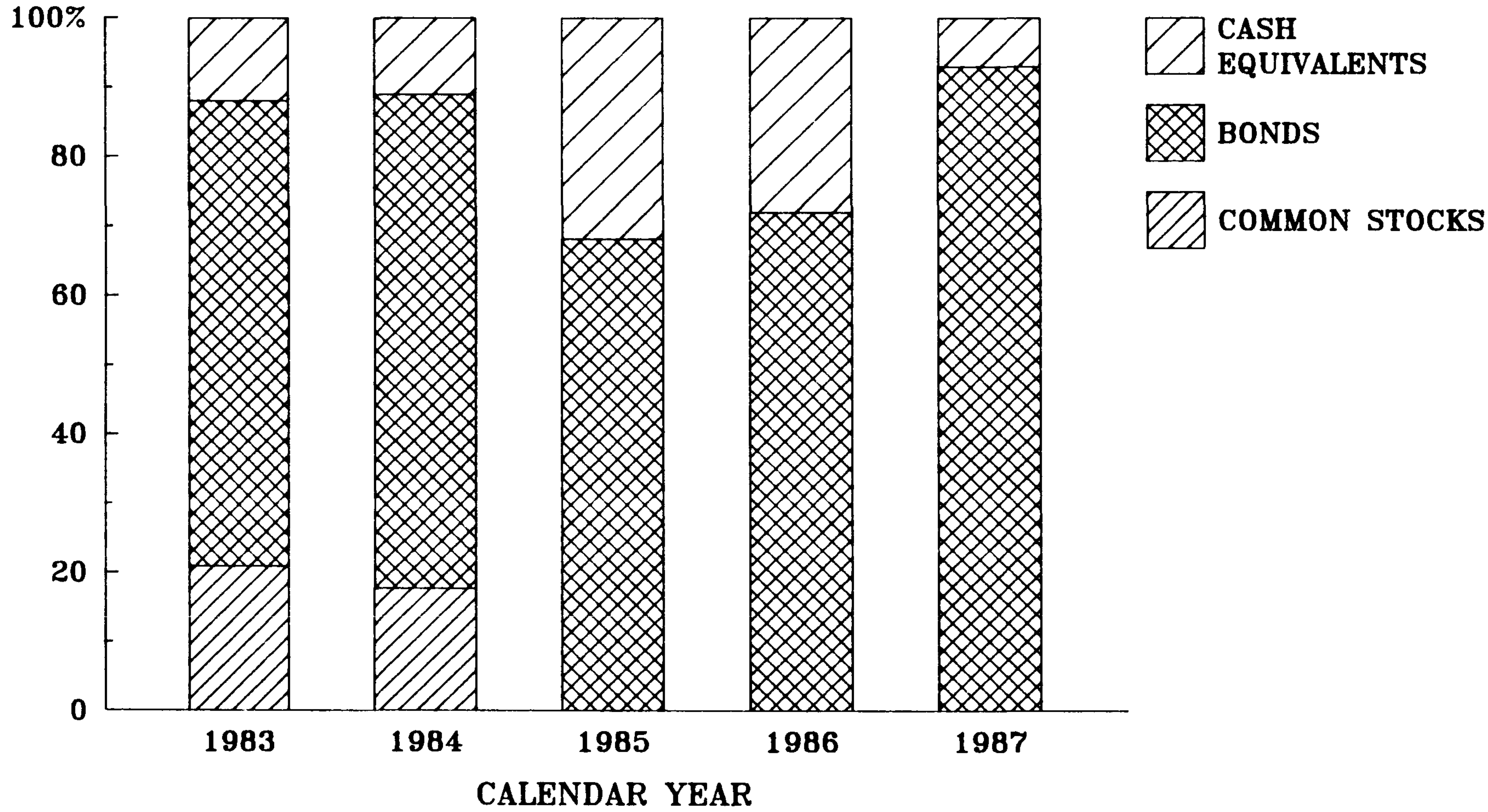
Treasury	34.9%
Federal Agency	10.5
Industrial	10.5
Utilities	13.7
Finance	6.6
Transportation	2.9
Mortgages	19.9
Miscellaneous	1.0

	100.0%

FIGURE 4

PERMANENT SCHOOL FUND

HISTORICAL ASSET MIX



PERCENT OF MARKET VALUE
END OF PERIOD ALLOCATIONS

TABLE 8

PERMANENT SCHOOL FUND

ASSET MIX

PERCENT OF MARKET VALUE
(End Of Period Allocations)

Calendar Year		Common Stocks $Million	Common Stocks Percent	Bonds $Million	Bonds Percent	Cash $Million	Cash Percent
1983		60.8	21.0	195.0	67.1	34.4	11.9
1984		54.9	17.8	219.4	71.2	33.8	11.0
1985		0.0	0.0	238.7	68.2	111.5	31.8
1986		0.0	0.0	262.3	72.0	102.1	28.0
1987	1Q	0.0	0.0	241.5	66.9	119.3	33.1
	2Q	0.0	0.0	296.8	82.2	64.1	17.8
	3Q	0.0	0.0	311.6	92.3	25.9	7.7
	4Q	0.0	0.0	327.3	93.0	24.5	7.0

Tab C

PORTFOLIO STATISTICS

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT
NET CASH FLOW AVAILABLE FOR INVESTMENT

For period of
October 1, 1987 - December 31, 1987

Teachers Retirement Fund	$ 43,000,000.00
Public Employees Retirement Fund	7,000,000.00
State Employees Retirement Fund	-0-
Public Employees Police & Fire	7,000,000.00
Highway Patrol Retirement Fund	-0-
Judges Retirement Fund	-0-
Post Retirement Fund	(61,867,099.00)
Supplemental Retirement Fund - Income	636,961.00
Supplemental Retirement Fund - Growth	264,239.00
Supplemental Retirement Fund - Money Market	(10,950,331.00)
Supplemental Retirement Fund - Bond Fund	(9,604,658.00)
Supplemental Retirement Fund - Index	667,309.00
Supplemental Retirement Fund - Bond Mkt.	(40,938.00)
Supplemental Retirement Fund - Guaranteed	15,609,230.00
Minnesota Variable Annuity Fund	$ (390,697.00)
Total Retirement Funds Net Cash Flow	$ (8,675,984.00)
Permanent School Fund	(14,972,026.00)
Total Net Cash Flow	$ (23,648,010.00)

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT
COMPOSITION OF STATE INVESTMENT PORTFOLIOS BY TYPE OF INVESTMENT
MARKET VALUE DECEMBER 31, 1987
(in 000's)

	CASH AND SHORT TERM SECURITIES	BONDS		STOCKS		ALTERNATIVE ASSETS	TOTAL
		INTERNAL	EXTERNAL	INTERNAL	EXTERNAL		
BASIC RETIREMENT FUNDS:							
TEACHERS RETIREMENT FUND	$ 106,603 5.38%	$ -0-	$ 480,139 24.23%	$ -0-	$1,123,773 56.71%	$271,004 13.68%	$ 1,981,519 100%
PUBLIC EMPLOYEES RETIRE. FUND	64,367 5.37%	-0-	290,413 24.23%	-0-	679,716 56.71%	164,030 13.69%	1,198,526 100%
STATE EMPLOYEES RETIRE. FUND	51,347 5.25%	-0-	237,003 24.23%	-0-	554,708 56.71%	135,051 13.81%	978,109 100%
PUBLIC EMP. POLICE & FIRE FUND	23,931 6.10%	-0-	94,358 24.05%	-0-	220,846 56.28%	53,277 13.57%	392,412 100%
HIGHWAY PATROL RETIRE. FUND	3,949 5.37%	-0-	17,815 24.23%	-0-	41,697 56.71%	10,062 13.69%	73,523 100%
JUDGES RETIREMENT FUND	215 5.38%	-0-	969 24.23%	-0-	2,268 56.71%	547 13.68%	3,999 100%
POST RETIREMENT FUND	285,015 7.04%	3,386,289 83.67%	-0-	375,951 9.29%	-0-	-0-	4,047,255 100%
MINNESOTA SUPPLEMENTAL FUNDS:							
INCOME SHARE ACCOUNT	18,322 9.40%	71,713 36.80%	-0-	24,633 12.64%	80,225 41.16%	-0-	194,893 100%
GROWTH SHARE ACCOUNT	529 0.71%	-0-	-0-	16,366 21.93%	57,720 77.36%	-0-	74,615 100%
MONEY MARKET ACCOUNT	70,569 100%	-0-	-0-	-0-	-0-	-0-	70,569 100%
COMMON STOCK INDEX ACCOUNT	-0-	-0-	-0-	-0-	2,354 100%	-0-	2,354 100%
BOND MARKET ACCOUNT	-0-	-0-	635 100%	-0-	-0-	-0-	635 100%
GUARANTEED RETURN ACCOUNT	-0-	-0-	20,728 100%	-0-	-0-	-0-	20,728 100%
MINNESOTA VARIABLE ANNUITY	330 0.24%	-0-	-0-	32,345 23.00%	107,936 76.76%	-0-	140,611 100%
TOTAL RETIREMENT FUNDS	$ 625,177 6.81%	$3,458,002 37.67%	$1,142,060 12.44%	$449,295 4.89%	$ 2,871,243 31.28%	$633,971 6.91%	$ 9,179,748 100%

PERMANENT SCHOOL FUND	24,525 6.97%	327,321 93.03%	-0-	-0-	-0-	-0-	351,846 100%
TREASURERS CASH	1,510,823 100%	-0-	-0-	-0-	-0-	-0-	1,510,823 100%
HOUSING FINANCE AGENCY	166,709 100%	-0-	-0-	-0-	-0-	-0-	166,709 100%
MINNESOTA DEBT SERVICE FUND	80,788 100%	-0-	-0-	-0-	-0-	-0-	80,788 100%
MISCELLANEOUS ACCOUNTS	75,435 100%	-0-	-0-	-0-	-0-	-0-	75,435 100%
N.E. MINNESOTA PROTECTION	23,373 100%	-0-	-0-	-0-	-0-	-0-	23,373 100%
MINNESOTA STATE BUILDING FUNDS	85,439 100%	-0-	-0-	-0-	-0-	-0-	85,439 100%
GRAND TOTAL	$2,592,269 22.59%	$3,785,323 32.99%	$1,142,060 9.95%	$449,295 3.92%	$2,871,243 25.02%	$633,971 5.53%	$11,474,161 100%

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

TRANSACTION AND ASSET SUMMARY
RETIREMENT FUNDS

	Net Transactions				Asset Summary (at market)			
	Bonds (000,000)	Stocks (000,000)	Total	Cash Flow	Short-term % of Fund	Bonds % of Fund	Equity % of Fund	Total (000,000) (at market)
December 1985	(3)	(76)	(79)	16	5.5	43.1	51.4	7583
January 1986	(7)	13	6	13	5.5	42.9	51.6	7618
February	36	(8)	28	34	5.3	42.9	51.8	8049
March	1	(3)	(2)	27	5.4	42.9	51.7	8429
April	(3)	(131)	(134)	20	7.3	42.9	49.8	8384
May	(2)	8	6	44	7.7	40.8	51.5	8450
June	226	326	552	625	8.3	41.4	50.3	8715
July	175	2	177	33	6.8	44.8	48.4	8488
August	147	59	206	39	4.6	45.5	49.9	8884
September	14	(67)	(53)	(48)	4.9	47.0	48.1	8490
October	4	(117)	(113)	10	6.2	46.5	47.3	8724
November	(17)	(3)	(20)	40	6.8	46.0	47.2	8864
December	(51)	44	(7)	12	7.0	46.0	47.0	8772
January 1987	34	21	42	15	6.2	44.4	49.4	9283
February	120	(9)	111	50	5.4	44.4	50.2	9576
March	76	(15)	61	18	4.9	44.5	50.6	9614
April	100	(7)	93	4	4.1	45.0	50.9	9383
May	3	(136)	(133)	33	5.9	44.6	49.5	9403
June	(42)	(22)	(64)	141	7.8	42.6	49.6	9706
July	283	(119)	164	52	6.4	44.9	48.7	10028
August	181	(14)	167	40	5.2	44.7	50.1	10020
September	50	10	60	59	5.3	44.5	50.2	9850
October	(12)	(37)	(49)	20	6.5	50.1	43.4	9077
November	9	(10)	(1)	69	7.4	51.1	41.5	8890
December	(3)	34	31	0	6.8	50.1	43.1	9180

Tab D

EXECUTIVE DIRECTOR
HOWARD J. BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

Room 105, MEA Building
55 Sherburne Avenue
St Paul, MN 55155
Tel (612) 296-3328
FAX. (612) 296-9572

February 24, 1988

TO: Members, State Board of Investment
Members, Investment Advisory Council

FROM: Administrative Committee

SUBJECT: Committee Report

The Administrative Committee met during the quarter to review several items:

INFORMATION ITEMS:

1. Update on 1987 Annual Report

A draft of the 1987 Annual Report was sent to members of the Board and the IAC for comments in December 1987. Final copies of the annual report were distributed the week of February 22, 1988.

2. Update on Legislation

The Board's 1988 legislative package has passed both the House and Senate Governmental Operations Committees and is waiting for floor action in both bodies.

A summary of the status of other bills of interest to the SBI is attached.

ACTION ITEMS:

1. Revised Quarterly Report Format

The Committee endorses the revised reporting format for the Basic and Post Funds as shown under Tab A of this Board folder and recommends staff continue similar revisions on reports for the other funds managed by the SBI.

2. Basic Funds Part IV Paper

The Committee renews its recommendation that the Board adopt the staff position paper on performance evaluation in the Basic Retirement Funds. The Committee originally recommended the Board adopt the paper at its November 25, 1987 meeting. However, the Board chose to postpone its action until the March 1988 meeting.

A copy of the paper is included as an attachment to this report.

3. Manager Continuation Policy Paper

The Committee reviewed a staff position paper which contains decision guidelines for retaining stock and bond managers. The Committee recommends the Board adopt the paper as presented and use the qualitative and quantitative criteria to evaluate the performance of stock and bond managers.

The Equity Manager and the Fixed Income Manager Committees also reviewed the paper during the quarter. Both Committees recommend that the policy paper be adopted by the Board and endorse the application of the decision guidelines to the Board's stock and bond managers.

A copy of the paper is included as an attachment to this report.

4. Board action required to secure repurchase transactions

The Committee discussed a resolution being drafted by the SBI's Assistant Attorney General authorizing the Executive Director to establish safekeeping arrangements with financial institutions concerning repurchase agreements.

If adopted, the resolution will allow the SBI to take action that will further secure the collateral used to back its purchase of repurchase agreements. The Committee recommends the Board adopt the resolution as drafted.

A copy of the resolution is included as an attachment to this report.

Attachments

BILLS OF INTEREST TO THE MINNESOTA STATE BOARD OF INVESTMENT
1988 LEGISLATIVE SESSION

Includes Action Through 2/23/88

* - pending from 1987 session
no action in 1988

DESCRIPTION OF BILL	HF/SF #	AUTHOR	CURRENT STATUS
SBI Bill	HF - 1806 SF - 1784	Simoneau D. Moe	House - General Orders Senate - Governmental Operations - Passed
Northern Ireland MacBride Principles (Affects future investments)	HF - 453 SF - 722	O'Connor Hughes	House - General Orders Senate - Governmental Operations heard 2/18, no action; scheduled for hearing on 3/8
Rule of 90 for MSRS, TRA	HF - 944 SF - 1506	Simoneau Dicklich	House - Governmental Operations - Passed Senate - Governmental Operations
Clarifies powers of State Fund Mutual Insurance Company	HF - None SF - 1710	None Chmielewski	House - None Senate - Employment - Passed
Environmental Trust Fund (SBI to invest funds)	HF - 2182 SF - 2000	Munger R. Moe	House - Environment and Natural Resources Senate - Environment and Natural Resources
* Establishes public pension plan bureau within DOER	HF - 1062 SF - 958	Simoneau D. Moe	House - Governmental Operations Senate - Governmental Operations
* Fiduciary responsibility for all Minnesota pension plans	HF - 1116 SF - 980	Simoneau D. Moe	House - Governmental Operations Senate - Governmental Operations (referred back to Committee at the end of the 1987 Session)
* Consolidating state constitutional offices (Affects membership of the SBI)	HF - None SF - 81	None Pogemiller	House - SF 81 referred to Governmental Operations Committee at the end of the 1987 session Senate - Passed full Senate in 1987

Please Note:

Other bills affecting benefits were pending at the end of the 1987 session (e.g. Rule of 85). They will not be reported here unless a committee acts on the bill during the 1988 session.

BASIC RETIREMENT FUNDS
INVESTMENT POLICY

PART IV
PERFORMANCE EVALUATION

Staff Position Paper
November 1987

EXECUTIVE SUMMARY

Performance evaluation is the process of understanding the investment results produced by a portfolio of financial assets. It is a short-term feedback and control process carried out within the context of investment policy. Properly conducted, performance evaluation assists in keeping a pension plan's investment program on track toward implementation of the plan's investment policy.

Meaningful performance evaluation is predicated on the comparison of investment results to expectations. Because expectations for pension plan performance are defined by the plan's investment policy, that policy should serve as the base against which to evaluate the effectiveness of the plan's investment performance.

A clear and concise framework for conducting performance evaluation greatly facilitates an understanding of the analysis. The Board's consultant, Richards & Tierney, has developed one of the most comprehensive and intelligible performance evaluation frameworks available. This paper provides a detailed example of the Richards & Tierney methodology.

Effective performance evaluation requires appropriate benchmarks and a sufficiently long time interval. Appropriate benchmarks are needed because they reflect the plan sponsors risk-return expectations for individual money managers, the aggregate of the plan's managers within an asset class, or the plan's total portfolio.

A sufficiently long evaluation time interval is necessary to overcome the "noise" resulting from the inherent random variability of investment results. In fact, performance evaluation carried out over short time intervals can actually be counterproductive. It can foster a pervasive focus on short-run results to the possible long-run detriment of the plan.

RECOMMENDED INVESTMENT POLICY STATEMENT: PART IV

The Board believes that performance evaluation is an integral part of the investment policy established for the Basic Retirement Funds. The Board recognizes that performance evaluation is predicated on the comparison of investment results to expectations.

Expectations for the Basic Fund's performance are represented by benchmarks developed on total fund, asset class, and individual manager levels. Thus, the Board attaches great importance to the design of appropriate benchmarks.

The Board also recognizes that performance evaluation conducted over short time intervals has little meaning due to the inherent "noise" of investment results. Therefore, the Board intends to apply performance evaluation over intervals of at least three-to-five years.

ROLE OF PERFORMANCE EVALUATION

Performance evaluation is the process of measuring and understanding the investment results produced by a portfolio of financial assets. Properly conducted, performance evaluation provides the plan sponsor with valuable information that can be used to more effectively implement and refine the pension plan's investment program.

Performance evaluation should address a number of issues, including:

- Rate of return and the sources of return earned by the plan's total portfolio and the components of its investment management structure.
- Risk incured by the plan's total portfolio and the components of its investment management structure.
- Impact of the plan's investment policy on plan assets.
- Effectiveness of active and passive management within the plan's investment management structure.
- Contributions made by the plan sponsor and money managers to investment results.

Performance evaluation should be distinguished from the purely mechanical process of performance measurement. The latter is a part of performance evaluation. Performance measurement entails calculating the change in value of a portfolio over time, taking into account interim cash flows. [1] Performance evaluation, on the other hand, uses the information produced by performance measurement to develop an understanding of the sources of investment returns and the quality of those returns relative to expectations.

As a simple example of the performance evaluation process, consider a pension plan that employs a common stock index fund as part of its investment management structure. The objective of the index fund is to closely track the performance of the specified common stock asset class target. An evaluation of the index fund's performance first involves measuring the return earned on both the index fund and the common stock asset class target. These returns are then compared to identify any "tracking error" on the part of the index fund. If tracking error exists, it must be determined whether that tracking error is significant and persistent enough to be of concern. Further, the causes of the tracking error should be identified. Finally, a judgment must be made whether the sources and the size of the tracking error merit a corrective action on the part of the plan sponsor and/or the index fund manager.

Performance evaluation is a short-term feedback and control process that is carried out within the context of investment policy. It is not meant to judge the appropriateness of investment policy. The appropriate investment policy is a long-term decision made by the plan sponsor. The question of whether a given policy is "correct" is one for which there is no definitive answer. [2] Performance evaluation is designed to keep the pension plan's investment program on track toward achieving the goals of the plan's investment policy, whatever that policy may be. Thus, it is reasonable to expect performance evaluation to answer a question such as, "Was XYZ bond manager's return last year acceptable?" Conversely, it is not reasonable to expect performance evaluation to answer the question, "Is our investment policy too aggressive?"

CONTRIBUTION OF THE PLAN SPONSOR

Performance evaluation almost invariably is conducted by the plan sponsor. For obvious reasons the performance evaluation process frequently focuses entirely on the contributions made by the plan's money managers. The importance of the money managers in the production of total portfolio returns is clear. These organizations are directly responsible for investing the plan's assets. However, the plan sponsor often fails (either consciously or unconsciously) to recognize that how it allocates assets among the various asset classes and money managers also will materially impact the effectiveness of investment policy implementation.

For example, suppose that the plan sponsor permitted the plan's actual asset mix to differ significantly from the policy asset mix. The result could be actual total fund performance that deviates noticeably from the return that would have been earned had investment policy been precisely implemented. If the deviation from the policy asset mix was intentional, then the plan sponsor's market timing efforts should be explicitly recognized and graded. If the deviation was unintentional, then the plan sponsor should be criticized for introducing unproductive additional risk into the plan's total portfolio. In either case, effective performance evaluation should recognize the importance of the plan sponsor's actions on fund performance, just as it considers the contribution of the plan's money managers.

POLICY AS THE BASE FOR PERFORMANCE EVALUATION

Meaningful performance evaluation is predicated on the comparison of investment results to expectations. If results are in line with expectations (for the right reasons, of course) then the investment program has been successful. If results fail to meet expectations, then corrective measures are called for, particularly if these failures are persistent and significant.

Expectations for pension plan performance are defined by the plan's investment policy. The investment policy represents the configuration of asset classes, asset class targets, and individual money manager investment styles that the plan sponsor believes is most capable of achieving the plan's investment objectives. Therefore, investment policy should serve as the base against which to evaluate the effectiveness of the plan's investment performance.

The expression of investment policy through specific and appropriate investment benchmarks permits the performance evaluation process to be both measurable and objective. For example, individual manager investment styles are represented by benchmark portfolios, often referred to as normal portfolios.[3] A plan's investment policy will allocate a certain percentage of the plan's assets to a particular investment style or normal portfolio. In evaluating the performance of the manager pursuing this style, the manager's investment results should be analyzed in relation to the manager's normal portfolio.

To carry the example further, investment policy establishes an asset class target for each asset class. It is the plan sponsor's obligation to ensure that funds are allocated among managers (both active and passive) within an asset class so that the combination of the managers' investment styles is consistent with the asset class target. In evaluating the performance of the plan sponsor, the aggregate investment results of the combined benchmarks of all managers within an asset class should be analyzed relative to the asset class target.

From the preceding discussion, it should be clear that performance evaluation is highly dependent on the construction of appropriate benchmarks. For this reason, SBI staff has devoted considerable attention to the benchmark building process. Unfortunately, the subject of benchmark building is relatively new and unrefined. As more efficient techniques are developed, performance evaluation will become more meaningful and useful.

FRAMEWORK FOR PERFORMANCE EVALUATION

A clear and concise framework for conducting performance evaluation greatly facilitates an understanding of the analysis. In recent years SBI staff has reviewed a number of performance evaluation methodologies. Staff has concluded that one of the most comprehensive and intelligible frameworks available has been developed by Richards & Tierney, the Board's consultant.

Table 1 presents a condensed sample of an R & T performance evaluation report. The data presented are actual results for the Basic Retirement Funds during the first quarter of 1987. An explanation of this report provides useful insights into the way in which investment policy and investment benchmarks are used to evaluate pension plan performance.

TABLE 1

PERFORMANCE EVALUATION REPORT
BASIC RETIREMENT FUNDS
FIRST QUARTER, 1987

LINE		ITEM	INCREMENTAL CONTRIBUTION	ITEM	ENDING VALUE
1	Beginning Market Value	A	$4,474,053,231		
2	Net Contributions	B	3,770,000	C	$4,477,823,231
3	Risk-free Asset	D	69,340,189	E	4,547,163,420
4	Investment Policy	F	485,236,763	G	5,032,400,183
5	Benchmark Misfit	H	15,012,604	I	5,047,412,787
6	Managers' Contribution	J	14,927,680	K	5,062,335,467
7	Allocation Tactics	L	12,723,562	M	5,075,059,029
8	Ending market Value	N	$5,075,059,029		

Source: Richards & Tierney, Inc.

As a first step to understanding the R&T analysis, consider the information contained in lines 1 and 8. Item A lists the market value of the Basic Funds at the beginning of the quarter as $4,474,053,231. Item N shows that the Basic Funds were worth $5,075,059,029 at the end of the quarter. The difference, $601,005,798, represents the results of the Basic Funds' investment management program for the quarter. The task of performance evaluation is to identify and explain the sources of those investment results.

Line 2 of the R&T analysis identifies the first source of change in the Basic Funds' assets. Net contributions of $3,770,000 (Item B) were made during the quarter. As shown in Item C, if no further action were taken (i.e., the Basic Funds' assets were placed "under the mattress"), the net contributions would have produced total end-of-quarter assets of $4,477,823,231.

But of course the Basic Funds' assets were invested. One investment option was to place all of the Basic Funds' assets in the lowest risk asset class available, namely Treasury bills. Line 3 calculates the effect of such a policy. Investing the beginning value plus the first quarter's net contributions in the risk-free asset would have added $69,340,189 to the Basic Funds' total market value (Item D), producing a total end-of-quarter market value of $4,547,163,420 (Item E).

The Basic Funds' investment policy entails more than simply investing in Treasury bills. In fact, the Basic Funds' investment policy calls for pursuing an aggressive, high expected return policy. (See Parts I and II of the investment policy paper.) This policy involves exposing the total portfolio to capital market risk, including a large common stock component. Line 4 indicates the contribution of that policy to the Basic Funds' investment results. Item F shows that the policy asset mix added $485,236,763 to the amount that would have been earned by investing the Basic Funds' beginning value plus net contributions only in the risk-free asset. Item G shows that standing alone, the Basic Funds' policy asset mix would have led to a total portfolio market value of $5,032,400,183 at the end of the first quarter.

Note that Item G is very similar to Item N. That is, the market value of the Basic Fund's total portfolio produced by the policy asset mix is very close to the portfolio's actual ending value. The remaining three sources of investment results (including active management) add relatively small amounts to the Basic Funds' total value. This observation serves to emphasize a point made at several times in the previous three parts of this investment policy paper. Namely, that the choice of an investment policy (embodied in the policy asset mix) represents the single most important decision that the plan sponsor can make. Particularly over an extended period of time, the policy asset mix decision will have the biggest impact on the plan's bottom line.

If all of the Basic Funds' assets were passively managed according to the policy asset mix, lines 5, 6, and (largely) 7 would be irrelevant. But active management is an element of the Basic Funds' investment management structure. Performance evaluation therefore should account for the contribution of active management decisions to investment results.

Line 5 indicates the contribution that money managers' investment styles, in aggregate, made to investment results. Within each asset class, the plan sponsor attempts to allocate funds among manager styles (as represented by their normal portfolios) so that in aggregate they match the asset class target. In practice, making a perfect match is difficult. Item 4 indicates that $15,012,604 was added to Basic Funds' market value by the fact that the policy allocations to the managers' benchmarks, in aggregate, produced returns that did not match the returns on the asset class targets. Item I shows what the Basic Funds' would be worth $5,047,412,787 if passive investments in the managers' benchmarks had been made according to policy allocations.

This incremental value produced by the managers' aggregate benchmark misfit is unintentional. Further, it can be negative just as often as it is positive. Therefore, the benchmark misfit is a source of unproductive risk that should be minimized by the plan sponsor. [4]

Another source of investment results is the efforts of active managers to outperform their benchmarks. Item J on Line 6 shows that during the quarter active managers added $14,927,680 to the Basic Funds by outperforming their benchmarks. The goal of active management, of course, is to consistently make this incremental contribution positive and large. Item K shows that the Basic Funds would have grown to $5,062,335,467 if assets had been assigned to the managers based on policy allocations.

Line 7 contains the effect of not allocating assets precisely according to policy guidelines. For example, in the Basic Funds stocks may not always be at their targeted 60% policy weighting. Or a manager may be above or below his targeted allocation. These allocation effects may be due to conscious decisions on the part of the plan sponsor to temporarily deviate from policy. Or, in the case of the Basic Funds, the deviations are due to market movements that cause shifts in allocations too small to warrant rebalancing back to policy allocations. In any event, Item L indicates that $12,723,562 was contributed to the Basic Funds' market value by these allocation deviations. Item M shows that this last source of investment results is the final reconciliation to the Basic Funds' ending value.

Table 2 of the R&T analysis takes the information presented in Table 1 and converts it from dollar to percentage terms. For example, an investment in the risk-free asset (Item A) generated a 1.46% return during the quarter. Similarly, the managers' benchmarks at their policy allocations, (Item B) produced, in aggregate, a 12.70% return for the quarter.

TABLE 2
PERFORMANCE EVALUATION REPORT
BASIC RETIREMENT FUNDS
FIRST QUARTER, 1987

	INVESTMENT RETURNS
RISK-FREE ASSETS	1.46%
INVESTMENT POLICY	12.35%
POLICY BENCHMARKS	12.70%
MANAGERS AT POLICY	13.04%
ACTUAL RATE OF RETURN	13.33%

The R&T performance evaluation format can be applied on three distinct levels: the total fund; the various asset classes; and, individual money managers. Conducting the R&T analysis on these three levels allows those issues of primary importance to performance evaluation, presented at the beginning of this paper, to be dealt with directly.

Additional methods of performance evaluation can extend the analysis performed under the R&T format. For example, performance attribution techniques have been developed that attempt to categorize the sources of stock and bond portfolio returns. These performance attribution techniques are based on models of investment risk whereby returns on stocks or bonds are related to particular financial factors.

Performance attribution and other additional performance evaluation methods can provide interesting insights into the risk-return performance of individual managers or groups of managers. But generally those insights are ancillary to the basic and more important information derived from the R&T analysis.

TIME FRAME FOR ANALYSIS

Indisputably, the longer the time period over which performance evaluation is conducted, the more meaningful are the resulting conclusions. Investment performance is inherently uncertain, exhibiting a large amount of random variability. Performance evaluation attempts to look through that variability in order to isolate the contributions that the plan sponsor and money managers make to a pension plan's investment results. Two primary elements make this analysis effective: appropriate benchmarks and a sufficiently long performance evaluation interval. The need for appropriate benchmarks was discussed earlier. To repeat, a properly constructed benchmark will reflect the risk-return expectations for an individual money manager, the aggregate of the plan's managers within an asset class, or the plan's total portfolio. As a result, appropriate benchmarks eliminate a portion of the "noise" surrounding investment performance by focusing on those factors truely relevant to the results of a manager's or plan's investment program.

The importance of the performance evaluation period's length is based on the statistical principal that outcomes due to random events will tend to cancel out over time. That is, the random component of investment performance has an expected value of zero. But in any given short time period, that variability can be very large relative to the returns generated by "true" investment skill. The longer is the evaluation period the more random variability will be removed and the more true investment skill will become apparent.

The difficulty that performance evaluators face is that the amount of time necessary to isolate investment skill with a high degree of confidence is quite long, on the order of decades. Naturally, that period is far too long for most interested parties to accept. As a result, the tendency among plan sponsors has been to evaluate performance over three-to-five year intervals. Evaluation periods of this length are certainly preferable to quarterly analysis. Nevertheless, three-to-five year performance evaluation analyses are still likely to be hampered by considerable random variability in results.

As a related and final comment, it should be noted that performance evaluation viewed over a short time frame (i.e., a quarter-to-quarter or even year-to-year) is of little use. In some circumstances it can serve to control extreme downside performance. But in general, performance evaluations conducted over short intervals are overwhelmed by the random variability of investment results, hence, providing little or no useful information.

In fact, performance evaluation carried out over short intervals can actually be counterproductive to a pension plan's goals. It can produce a pervasive attitude in the plan's management that focuses on short-term results. Decisions in response to short-term evaluations may be made to the long-run detriment of the plan. If there has been one primary theme of the four parts of this investment policy paper, it is that the investment policies of most pension plans (including the Basic Funds) are long-term in nature. Performance evaluation conducted under these policies should be similarly long-term.

FOOTNOTES

1. The mathematics involved in performance measurement are straightforward. However, the difficulty of establishing a reliable and flexible system for collecting accurate transactions and holdings data should not be underestimated.

2. An investment policy is "correct" if it is consistent with the plan sponsor's risk-return expectations. That consistency is a highly subjective determination. Further, an investment policy is "correct" if it is internally consistent. That is, the various components of the investment policy (i.e., investment objectives, policy asset mix, investment management structure) are consistent.

3. See Part III, Section 4 of the investment policy paper for a more detailed discussion of normal portfolios.

4. See Part III, Section 4 for a discussion of reconciling aggregate manager investment styles with an asset class target.

MANAGER CONTINUATION POLICY

Staff Position Paper
February 1988

EXECUTIVE SUMMARY

Evaluating the performance of the SBI's diverse group of money managers is an integral feature of the Board's investment policy. In order to make informed judgments regarding the current capabilities of the Board's managers, staff has developed a set of specific evaluation guidelines. These guidelines form a "manager continuation policy" that will assist the Board in its decisions concerning retention and termination of money managers.

Staff believes the proposed manager continuation policy offers these primary benefits:

- It encourages a comprehensive and consistently applied analysis.
- It fosters a long-term attitude toward performance evaluation.
- It communicates investment objectives between the Board, its managers and its staff.

Staff recommends the Board's manager continuation policy include both quantitative and qualitative performance criteria. The difficulty of statistically confirming investment skill makes an absolute reliance on portfolio return numbers inadvisable. Qualitative aspects of a manager's operation should also be considered.

QUALITATIVE CRITERIA

Qualitative performance evaluation criteria relate to those aspects of a money manager's investment operation that cannot be expressed as measurable targets. Investors such as the Board must attempt to deduce the skills of money managers by searching for the presence or absence of basic building blocks of sound investment management within a manager's firm:

Elements of an Efficient Investment Organization

- o Experienced and talented staff
- o Organizational stability
- o Clear leadership
- o Planned growth
- o Adequate client support

Elements of a Well-defined Investment Approach

- o Clearly specified investment style
- o Well-conceived decision-making process
- o Adequate feed-back and control mechanism

Table 1 provides a more specific list of criteria which can be used to evaluate a manager's investment organization and investment approach. Staff recommends these criteria be used in the qualitative evaluation of the Board's managers.

Failure to meet one or more of these criteria should not be sufficient reason to terminate a manager. As a general rule, a qualitative evaluation should be applied in conjunction with quantitative evaluation to determine whether a manager is meeting the Board's expectations. However, it is important to specify exceptions to this general rule. Certain changes in a manager's organization or investment approach will dictate re-evaluation of the Board's relationship with the firm. Staff recommends that the following events trigger this analysis and automatically place the manager on probation:

- o A change in the firm's ownership or important members of its management team.
- o A change in the manager's investment style.

- An inability to create or maintain an appropriate benchmark portfolio.

Staff recommends that a manager remain on probation no longer than six months. In the interim, if the issues of concern are not satisfactorily resolved, the manager should be terminated.

QUANTITATIVE CRITERIA

Quantitative performance evaluation criteria relate to those aspects of a money manager's operation that can be analyzed relative to measurable targets. A manager's return relative to an appropriate benchmark represents "the bottom line" for a plan sponsor. However, the investment performance of superior and inferior managers exhibits a large amount of variability, even when returns are measured relative to a customized benchmark.

Quantitative performance criteria must take this variability into account. A poorly designed measure could lead a plan sponsor to erroneously classify managers as inferior. This, in turn, could create costly and excessive manager turnover.

Figure 1 depicts a statistically valid method of assessing the variability of manager performance relative to a benchmark. The horizontal line represents the return on the benchmark. Performance exceeding (falling below) the benchmark will plot above (below) the horizontal line. The area between the two curved lines represents a confidence interval based on the manager's actual return relative to its benchmark. Returns within the confidence interval represent performance due either to skill or to chance. Returns falling outside the confidence interval represent superior or inferior performance significant enough that the odds of it being due to chance are low. The confidence interval range narrows over time. As more information is received, the ability to make judgments about a manager's investment skill increases.

Staff recommends that this confidence interval approach be incorporated in the Board's quantitative evaluation of money managers. Furthermore, staff recommends establishing two lower confidence bands. On the downside, breaching the first level would result in a manager being placed on probation. Breaching the second level would cause termination.

REPORTING FORMAT

Staff has designed a performance evaluation report format that incorporates the salient features of the qualitative and quantitative criteria presented in this paper. An example of this report format for one of the Board's managers is provided in Figure 2.

Qualitative evaluations would be reported on an exception basis. Only in cases where there is cause for concern, or where the manager is exceptionally positive, would the criteria be highlighted. Quantitative evaluations would be presented using the confidence interval approach.

Staff recommends that the performance evaluation reports be reviewed by the IAC on a quarterly basis and presented to the Board. Staff further recommends that the appropriate report be shared with each of the Board's managers during the semi-annual meetings conducted by staff.

NEW MANAGERS

The Board is likely to add new equity and fixed income managers in the future. Hiring new managers does not necessarily imply that the Board is dissatisfied with its existing managers. The Board may simply come to the conclusion that a particular new manager can do a better job than an existing manager. A flexible approach to manager retention, that is cognizant of the costs of manager turnover, can benefit the Board's investment program.

The qualitative and quantitative performance evaluation criteria discussed in this paper should be used in the hiring of new managers. Staff intends to discuss the subject of new manager hiring at length in a future position paper.

SECTION 1: INTRODUCTION

During 1987, the Board adopted a comprehensive investment policy for the Basic Retirement Funds. That policy provides a set of decision rules that guide the long-run investment management of the Basic Funds. The Basic Funds' investment policy has been described in a four-part series of staff position papers presented in recent Board Quarterly Reports.

An important component of the Basic Funds' investment policy is an investment management structure which utilizes a number of common stock and bond managers. As part of this investment management structure, the Board allocates funds to both passive and active money managers. Further, by design, the Board's active managers pursue a variety of investment styles.

Evaluating the performance of this diverse group of money managers is an integral feature of the Board's investment policy. The Board expects its active managers to add value to their investment styles. Passive managers are expected to track the performance of their particular indices. In aggregate, the Board expects its managers, within each asset class, to outperform their respective asset class targets.

The Board strives to hire managers who it believes can satisfy these performance expectations. But the Board's perception of its managers' abilities may change over time. For example, changes in a manager's organization can adversely affect the manager's investment decision-making. Or, by gaining more experience with a manager, the Board may discover unsatisfactory aspects of a manager's investment process that previously had not been apparent. In any event, managers in whom the Board no longer has strong confidence should not be retained. The purpose of the Board's manager performance evaluations is to determine that level of confidence.

Performance evaluation is a complex and often frustrating process. Without sound procedures, this process can easily break down into a series of short-run, contradictory decisions that are counterproductive to a pension plan's long-run interests. In order to make informed judgments regarding the current capabilities of its managers, the Board requires a broad, clearly specified evaluation procedure.

Part IV of the staff's investment policy paper presented a number of general performance evaluation principles. This paper extends those concepts by developing a specific set of guidelines for evaluating the performance of the Board's common stock and bond managers.

Staff believes that this "manager continuation policy" offers three primary benefits:

- It encourages a comprehensive and consistently applied analysis.
- It fosters a long-term attitude toward performance evaluation.
- It communicates investment objectives between the Board, its managers, and its staff.

As a final introductory note, many of the ideas presented in this paper are not new. Staff has been applying and refining innovative performance evaluation techniques for several years.

Periodic reports have been made to the Board in its Quarterly Report. However, this position paper represents staff's first attempt to present a comprehensive approach to manager performance evaluation.

SECTION 2: AMBIGUITY OF SUPERIOR PERFORMANCE

Investment management is similar to other businesses in that clients contract to receive services that presumably will make them better off. Specifically, clients hire money managers because they believe that the managers will make investment decisions that will enhance the clients' wealth. However, the investment management business is unusual in that the quality of its "product" appears so readily quantifiable and simple to evaluate. One merely observes changes in the value of money managers' portfolios over time and makes appropriate judgments concerning the managers' talents.

Unfortunately, performance evaluation is not as straightforward as the process described above. Two important issues complicate the analysis:

- Superior investment performance is a highly relative concept.
- Investment performance is inherently uncertain.

THE RELATIVE NATURE OF INVESTMENT PERFORMANCE

The quality of investment performance is inextricably linked to investment objectives. Investment skill can be properly assessed only if the evaluation is conducted within the context of the investment objectives pursued by the investor.

In some cases this principle is obvious. For example, a bond manager's returns should not be compared to the performance of a stock market index. The bond manager's investment objectives are unrelated to the performance of common stocks. While this distinction is less clear within asset classes, it is still quite relevant. For example, "growth stock" manager returns generally should not be compared to the performance of the entire stock market. The growth stock manager's investment goal is to select the best performing stocks from a subset of the securities which comprise the stock market. Therefore, the growth stock manager's returns at times may deviate from the returns on the market for reasons totally unrelated to the manager's investment skill. A valid performance evaluation approach should explicitly take into account the investment objectives of the managers being evaluated.

INHERENT VARIABILITY OF INVESTMENT PERFORMANCE

The investment results of even superior managers exhibit a large amount of random variability. This makes it difficult to identify investment skill. A "good" money manager may be right 51% of the time as opposed to a "poor" manager who is right 50% of the time. In the near-term, the "poor" manager's portfolio might outperform the superior manager's portfolio simply by random luck. Over the longer-term, the superior manager's skill will become apparent. But the time period required to make this distinction may be considerably longer than most clients are willing to accept.

NEED FOR APPROPRIATE BENCHMARKS

One means of addressing these two issues is to construct unique benchmarks for each money manager. Properly designed, such benchmarks reflect a manager's investment style. Thus, it is the appropriate bogey against which to evaluate the manager's investment performance. Further, because benchmarks are tied to the manager's investment style, some (but by no means all) of the "noise" caused by the random variability of capital market returns is removed from the evaluation process. (Benchmark, or normal portfolios, are described in greater detail in Part III, section 4 of the Basic Retirement Funds' investment policy paper.)

Staff believes that appropriate benchmarks are a crucial element of manager performance evaluation. Consequently, staff has devoted considerable attention to the subject and has worked closely with the Board's consultant, Richards & Tierney, to build benchmarks for the Board's managers. Nevertheless, benchmarks are not a panacea for the difficulties of performance evaluation. Capturing a manager's investment style in a benchmark is an inexact process. Moreover, even given a precise benchmark, a talented manager's superior performance relative to that benchmark may still be difficult to discern in the near-term because of the variability of investment returns.

Therefore, while the use of benchmarks in performance evaluation is a considerable improvement over simply comparing a manager's returns to the market or to other managers, a blind reliance on near-term relative performance comparisons is not likely to lead to sound manager retention decisions. Other, less quantifiable factors have to be considered. Therefore, staff recommends that benchmarks be integrated into a decision-making framework which incorporates both qualitative and quantitative evaluation criteria. The following two sections describe that framework.

SECTION 3: QUALITATIVE CRITERIA

Qualitative performance evaluation criteria relate to those aspects of a money manager's investment operations that cannot be expressed as measurable targets. By definition, these criteria cannot be incorporated into numerical decision rules. As a result, they may require significant judgments on the part of evaluators. Nevertheless, the ambiguity of superior investment performance necessitates the use of qualitative criteria. Clients must attempt to deduce the skills of money managers by searching for the presence or absence of basic building blocks of sound investment management within the manager's firm.

Qualitative guidelines can be viewed as necessary, but not sufficient, conditions for consistent superior investment performance. To the extent that a manager substantially fails to satisfy these criteria, the client lacks confidence that the manager has the necessary components of a successful investment operation. On the other hand, even if the manager fully satisfies these criteria, there is no guarantee that the manager will exhibit long-run superior results. But because superior investment abilities are so difficult to identify, clients are forced to rely heavily on qualitative inferences of managers' skills.

Staff has categorized qualitative performance evaluation guidelines into two primary areas of a manager's operations: Organization and Investment Approach.

ORGANIZATION

An efficient organization is a necessary element of a successful investment program. To evaluate the quality of a manager's organization, staff has divided the Organization criteria into five subcategories:

ELEMENTS OF AN EFFICIENT INVESTMENT ORGANIZATION

- o Experienced and talented staff
- o Organizational stability
- o Clear leadership
- o Planned growth
- o Adequate client support

To briefly summarize these items, highly motivated and talented professionals lie at the heart of any successful investment organization. The evaluation criteria should judge the experience and quality of the professionals employed by a manager.

A superior money management organization not only offers incentives to retain talented professionals, but also integrates these people into a cohesive structure. This requires effective leadership and organizational stability.

A manager should have some type of business growth plan in place. Uncontrolled growth can impede a manager's performance. The growth path of a successful manager firm should be consistent with the organization's capabilities.

Finally, large institutional clients, such as the Board, have a variety of administrative requests of a manager, including data collection, benchmark construction, strategy reports, etc. A manager's organization should be responsive to such needs.

INVESTMENT APPROACH

Talented people blended into an efficient organization are not enough to produce superior investment results. A well-defined investment approach is needed to focus the resources of a manager's organization in a particular direction. To evaluate a manager's investment approach, staff has developed the following three subcategories:

ELEMENTS OF A WELL-DEFINED INVESTMENT APPROACH

- o Clearly specified investment style
- o Well-conceived decision-making process
- o Adequate feedback and control mechanism

To briefly summarize these items, the capital markets represent a diverse and constantly evolving system. A manager cannot hope to attain significant expertise in all segments of the marketplace. Therefore, without the discipline of a well-defined investment approach, a money manager may expend its resources on segments of the market where it has no comparative advantage over other investors.

A manager's investment approach includes a specification of those segments of the market in which the manager chooses to focus its energies. This specification can be defined as the manager's investment style. A manager's investment style should reflect a thoughtful approach to identifying attractive segments of the market. Further, a manager should have consistently and successfully applied its investment style over a variety of market conditions.

A manager's investment style is implemented through a decision-making process. This decision-making process should be clear and well-conceived. It should involve a set of logical portfolio construction procedures, consistent with the manager's investment style.

The manager's investment approach should also entail a feedback and control system. The manager should understand its performance relative to an appropriate benchmark. The manager should constantly be gathering information that can be used to refine the investment approach and make it more effective.

DECISION GUIDELINES

Table 1 provides a more detailed breakdown of the qualitative performance evaluation criteria described above. The various subcategories are divided into a specific list of criteria which can be used to evaluate the status of the Board's managers.

Failure to meet one or more of these criteria should not serve as grounds for the immediate termination of a manager or even placing the manager on probation. As a general rule, a qualitative evaluation should be conducted in conjunction with the quantitative evaluation to determine the Board's confidence in a manager.

However, staff recommends several important exceptions to this general rule. Certain changes in a manager's organization or investment approach should dictate immediate re-evaluation of the Board's relationship with the firm. Staff recommends that the following events trigger this analysis and automatically place a manager on probation.

- o A change in the firm's ownership or important members of its management team.
- o A change in the manager's investment style.
- o An inability to create or maintain an appropriate benchmark portfolio.

In the event that a manager is placed on probation, staff should meet with the manager as soon as possible to discuss the Board's concerns. Staff further recommends that a manager remain on probation no longer than six months. In the interim, if the issues of concern are resolved to the Board's satisfaction, the manager should be removed from probation. However, if the issues are not satisfactorily resolved, the manager should be terminated no later than at the end of this six-month period.

SECTION 4: QUANTITATIVE CRITERIA

Quantitative performance evaluation criteria relate to those aspects of a money manager's operation that can be analyzed relative to specific guidelines. These criteria traditionally have been applied to the returns produced by managers. But they could also be extended to include the risk incurred by managers.

A manager's performance relative to an appropriate benchmark represents the bottom line of the manager's business. For good reason then, both managers and their clients concern themselves with relative rates of return when evaluating the managers' performance. However, as discussed in Section 2, the difficulty of statistically confirming investment skill makes a heavy reliance on portfolio return numbers inadvisable. Qualitative aspects of a manager's operation should also be considered.

Furthermore, because of the ambiguity of superior performance, quantitative evaluation criteria should be designed to avoid two very undesirable outcomes:

- o Superior managers may erroneously be identified as inferior, and vice versa, simply by random chance.
- o Too many managers, including those with investment skill, may be classified as inferior and fired, resulting in costly excessive manager turnover.

CONFIDENCE INTERVAL APPROACH

Figure 1 presents a general illustration of an approach to quantitative performance evaluation that recognizes these two potential pitfalls. It takes into account both a manager's performance relative to a specific benchmark and the variability of the manager's returns relative to that benchmark.

The horizontal line in Figure 1 represents the return on a hypothetical manager's benchmark. The manager's actual return less the return on the benchmark is shown by the jagged line. Thus, when the manager has exceeded (fallen below) the benchmark's return, his relative return line will plot above (below) the horizontal line. The graph is cumulative, showing the manager's return relative to the benchmark since the inception of the analysis.

Naturally, a client would like its managers' returns to always lie above the horizontal line. But even the most skillful manager may underperform its benchmark for periods of time. How much underperformance should a client permit before becoming convinced that a manager is inferior? Conversely, by how much must the manager outperform its benchmark before a client can feel comfortable that the manager is truly superior? Because the manager's performance relative to its benchmark has a large variable element to it, a precise answer to these two questions cannot be given. Rather, a statistical analysis is required that reduces the probability of an incorrect answer to an acceptable level.

Avoiding a long discussion of these statistical concepts (see Appendix A for additional information), the two curved lines in Figure 1 represent a confidence interval surrounding the return on the manager's benchmark. In between the upper and lower confidence interval bands lie a range of performance relative to the benchmark for which it is difficult to distinguish skill from random chance. That is, in this range a manager's superior or inferior performance relative to the benchmark might be due to skill (or lack thereof). But there also is a high probability that the relative performance is due simply to chance.

On the other hand, if a manager's relative return falls outside of the confidence interval, this result represents superior or inferior performance is significant that the odds of it being due to chance alone are low. In such a case, a judgment concerning the manager's investment skill can be rendered with a reasonable degree of confidence.

Notice that the confidence interval is very wide initially and then narrows as time progresses. This is because as more performance data is received over time, statistically speaking, the ability to make judgments about the manager's investment skill increases. With more information, less of a difference between the manager's returns and those of its benchmark is needed to make an informed judgment about the manager's investment skill.

DECISION GUIDELINES

Staff recommends that this confidence interval approach be incorporated as part of the Board's manager continuation policy. Furthermore, staff recommends establishing two levels of confidence intervals, particularly with respect to performance below the benchmark. Specifically, as illustrated in Figure 2, staff recommends setting a:

- Probation Level. Breaching this first lower band would result in a manager being placed on probation. This level of inferior performance is low enough to cause concern, but the possibility that it is due simply to chance is still high.

- Termination Level. Breaching this second lower band would result in a manager being fired, unless extraordinary offsetting factors exist. This level of inferior performance is significant enough that is unlikely that the manager possesses investment skill.

SECTION 5: REPORT FORMAT

Staff has designed a performance evaluation report format for the Board that presents the salient features of a manager's evaluation. This format briefly summarizes the qualitative and quantitative performance evaluation criteria as applied to each of the managers. Figure 2 illustrates the proposed report format as applied to IDS Advisory, one of the Board's external equity managers, for the fourth quarter of 1987.

The first part of Figure 2 lists pertinent information about the manager including: the portfolio manager handling the Board's account; the Board's assets invested by the manager; and, the firm's investment philosophy.

The next portion of Figure 2 presents a qualitative evaluation of the manager. It is conducted on an exception basis. That is, staff assumes that each of the Board's managers is at least adequate with respect to the qualitative criteria. Only in those cases where there is some cause for concern, or where the manager's situation is exceptionally positive, is the criteria highlighted.

As part of the manager's quantitative evaluation, the next portion of Figure 2 presents the performance of the manager's actual portfolio and its benchmark portfolio over the recent quarter, year, and since year-end 1983. The graph in Figure 2 completes the quantitative evaluation by applying the confidence interval approach discussed in Section 4.

The performance evaluation report concludes with a brief recommendation from staff as to the manager's status. Staff will recommend that either:

- o No action required. The manager has adequately satisfied the Board's qualitative and quantitative performance evaluation criteria.
- o Probation. The manager has failed to satisfy certain important qualitative criteria and/or the manager's performance relative to its benchmark is sufficiently poor to cause concern.
- o Termination. The manager has been unable to satisfy concerns which caused it to be placed on probation for qualitative reasons and/or its performance relative to its benchmark is significantly inferior.

If the Board desires, staff can present the performance evaluation data to both the Board and the IAC on a quarterly basis. However, staff does not expect the evaluations to change materially from quarter-to-quarter.

Staff recommends that the performance evaluation material presented to the Board also be shared with the managers. Staff meets semi-annually with each of the Board's equity and fixed income managers. These meetings offer a convenient forum to discuss the items displayed in the performance evaluation reports. Staff will incorporate the results of these meetings in its reports to the IAC and the Board.

SECTION 6: NEW MANAGERS

The Board is likely to add new equity and fixed income managers in the future. Many attractive active management approaches are available. Further, the investment management business is highly competitive and dynamic. New active management approaches appear frequently. Manager organizations change as professionals move from firm to firm. As a result, the Board can benefit by actively seeking new managers who may be able to deliver performance superior to its existing managers.

Hiring a new manager need not imply that the Board is seriously dissatisfied with its existing managers. The Board may simply come to the conclusion that a particular new manager can do a better job than an existing manager. Thus, the Board should not necessarily wait until an existing managers is placed on probation before considering taking action. Flexibility with respect to its manager group will present the Board with considerably more options than awaiting seriously poor performance.

However, a flexible approach to hiring new managers should avoid rapid and therefore costly turnover. The expense of terminating and replacing managers likely runs between 2-4% of the affected assets. The Board should be confident that the benefits of changing managers are worth the cost. Nevertheless, in those cases where the benefits appear to outweigh the costs, the Board should not hesitate to change managers.

MANAGER SELECTION CRITERIA

The process of hiring new managers should be as comprehensive and consistently applied as the process of evaluating existing managers. The performance evaluation criteria developed in this report should serve the Board well when searching for new managers, as well as when evaluating existing ones. As discussed previously, the qualitative criteria represent necessary conditions for successful investment management. Staff recommends that no manager be hired unless it rates excellent in terms of those qualitative criteria.

With respect to the quantitative criteria, staff recommends that no manager be hired who does not possess an appropriate benchmark. Ideally, the manager should provide historical risk and return data on its benchmark and be able to demonstrate superior performance relative to it. However, this requirement will not likely always be attainable. Nevertheless, the condition that new managers construct benchmarks for future performance evaluation should become standard Board policy.

The issue of hiring new managers warrants further discussion. Staff plans to present a report on this subject at the next Board meeting.

APPENDIX A

This appendix provides a non-technical description of the confidence intervals used in the proposed manager continuation policy. More detailed discussions can be found in standard statistics textbooks.

The construction of a manager's confidence interval begins with a very simple assumption: The manager has no investment skill. Referring to Figure 1, if this assumption were true, then the manager's cumulative relative return (i.e., the cumulative difference between the return on the manager's portfolio and the return on the manager's benchmark) would be expected to plot along the horizontal line representing the manager's benchmark returns. The manager would be expected to neither outperform nor underperform its benchmark over any given time period.

However, due to the inherent variability of investment returns, even a no-skill manager's returns will sometimes exceed those of its benchmark. At other times, this manager's returns may fall below the benchmark. These results will occur despite the fact that, over the long-run, the manager's performance will equal that of the benchmark.

Can we make some statements about the range over which the no-skill manager's returns are likely to fall around its benchmark's returns? A confidence interval provides a statistical description. Based on the manager's past variability of returns relative to its benchmark, we can calculate, with a specified probability of being correct, the range of performance within which we expect the no-skill manager's cumulative relative return to fall. We refer to this range as the confidence interval for the manager.

The vertical width of the confidence interval is determined by the probability of the confidence interval encompassing the manager's cumulative relative returns over time. The higher (lower) is the probability of capturing the manager's cumulative returns, the wider (narrower) will be the confidence interval.

For example, assume that the confidence interval in Figure 1 is constructed to encompass 80% of the possible cumulative relative returns that the no-skill manager might produce. That is, assuming that the manager's relative returns exhibit the same variability in the future that they have in the past, there is an 80% probability that the manager's cumulative relative return will fall somewhere between the upper and lower confidence levels. This implies that there is a 20% probability that the manager's cumulative relative return will lie <u>outside</u> the confidence interval. Even more specifically, there is a 10% probability that the manager's cumulative relative return will fall above the upper confidence level and a 10% probability that it will fall below the lower confidence level.

The particular percentage of possible cumulative relative returns captured by the confidence interval will change depending on how we construct it. There is no single "correct" percentage. Presumably, we want returns falling outside of the confidence interval to <u>signal unusual events</u>. The purpose of this signal is to make us re-think our no-skill assumption. That is, if a manager's cumulative relative return exceeds the upper confidence level, then perhaps the manager's investment talents actually are superior. Conversely, if the manager's cumulative relative return falls below the lower confidence level, then perhaps the manager's talents actually are inferior.

The appropriate percentage to use in constructing manager confidence intervals depends on one's view of what is an unusual event. Is a one-out-of-five event unusual? How about a one-out-of-ten?

Staff recommends that two confidence intervals be used in the manager continuation policy. The first confidence interval would capture 80% of the manager's possible cumulative relative returns. That means that 10% of the time, a no-skill manager's cumulative relative return will fall below the lower confidence level simply by chance, not because the manager is actually inferior. Staff believes that this 10% probability is small enough that if a manager does fall below the lower confidence level, then the Board should conclude that the manager is inferior and should be fired.

The second confidence interval recommended by staff would establish a probationary performance level. This confidence interval is narrower than the first. It is designed to capture 60% of a no-skill manager's possible cumulative relative returns. Thus, there is a 20% chance that a no-skill manager's cumulative relative return will fall below the lower confidence level simply by chance. If the manager does fall below this probationary level, the manager should not immediately be fired. There is a one-in-five chance that the event was simply due to random variability. Nevertheless, the event is unusual enough that it should serve as a warning that the manager may actually be inferior and that future action by the Board might be required.

TABLE 1

MANAGER PERFORMANCE EVALUATION
QUALITATIVE CRITERIA

I. ORGANIZATION/STAFF

A. Experience and Quality

1. Professionals exhibit a high degree of competence and experience.

2. Professionals have managed money successfully under variety of market conditions.

3. Professionals are familiar with needs of large institutional clients.

4. Firm demonstrates its commitment to integrity and fiduciary responsibility.

B. Stability

1. Current group of professionals is responsible for firm's track record.

2. Turnover has not been extraordinary in terms of either numbers of people or reasons for their departures.

3. When turnover has taken place, prompt corrective measures have been taken.

4. Control or business emphasis of firm has not changed, or in those case where it has, the firm's investment process has remained intact.

C. Leadership

1. An individual is clearly accountable for directing and motivating the firm's professionals.

2. No serious dissension among professionals.

D. Growth in Assets/Accounts

1. Firm has growth policy in place, consistent with its investment approach.

2. Account load of portfolio managers is not excessive.

3. No extreme gain or loss of accounts has occurred in recent years.

TABLE 1 (Cont'd)

E. Client Relations

1. Support staff is adequate to provide satisfactory client servicing.

2. Firm demonstrates willingness to cooperate with clients to achieve client goals.

II. INVESTMENT APPROACH

A. Investment Style

1. Investment style is attractive in that it reflects a thoughtful consideration of reasonable risk-return opportunities.

2. Investment style has been consistently applied over a variety of market environments.

3. Investment style is represented by an appropriate benchmark.

B. Decision-Making Process

1. Portfolio construction procedures are specified, efficient, and consistent with the investment style.

2. Investment research coverage is thorough.

3. Decision-making hierarchy among professionals is clearly specified.

4. Firm demonstrates a willingness to make short-term active bets relative to its benchmark.

C. Performance Review Process

1. Comparisons of risk-return performance relative to a pre-determined benchmark are made.

2. Attempts are made to identify and rectify sources of performance problems.

3. Performance results, sources of returns, and investment strategy are clearly presented to clients.

FIGURE 1

QUANTITATIVE PERFORMANCE EVALUATION
CONFIDENCE INTERVAL APPROACH

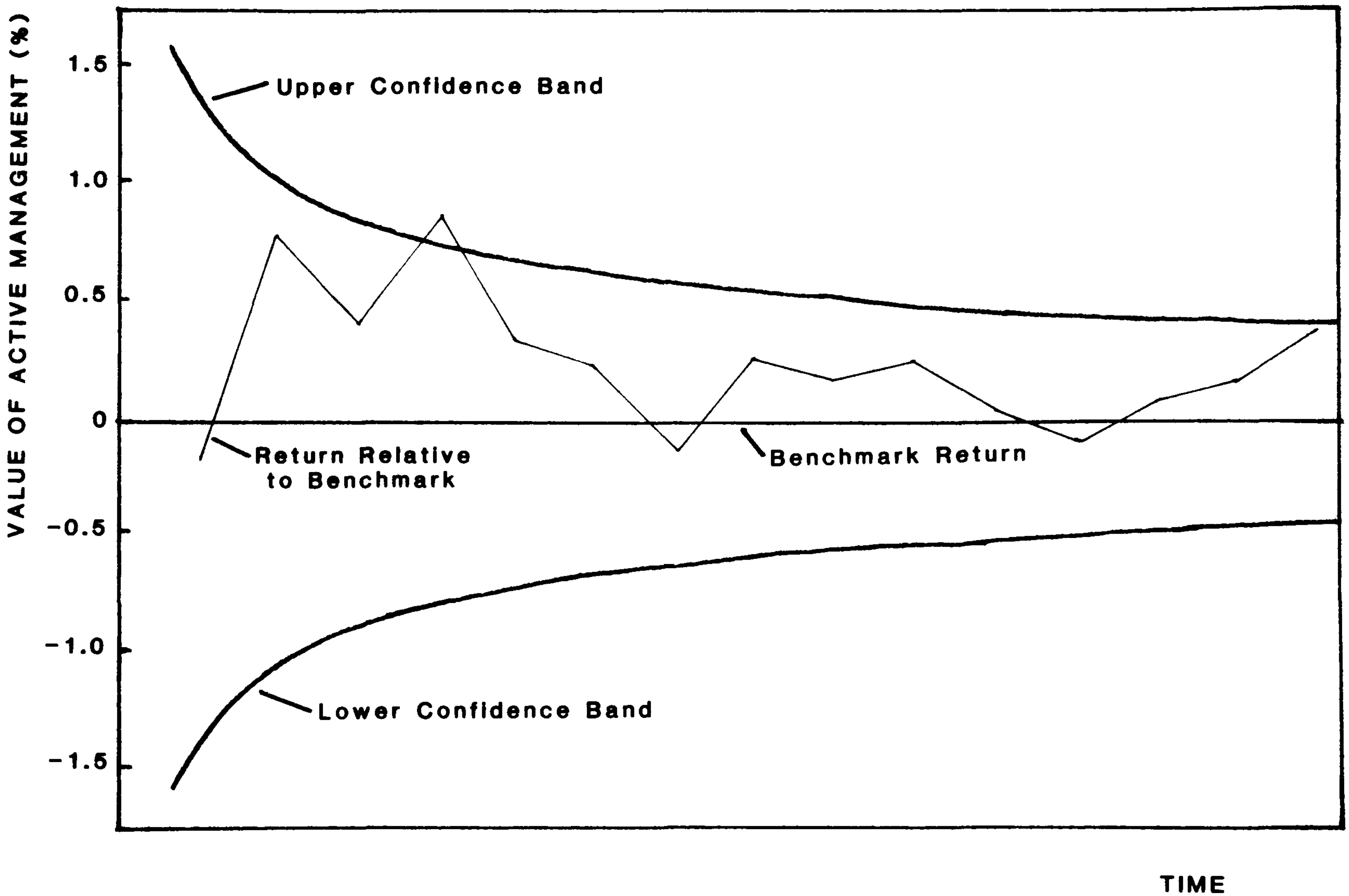


FIGURE 2

PERFORMANCE EVALUATION REPORT
IDS ADVISORY
4th Quarter, 1987

PORTFOLIO MANAGER: Mitzi Malevich

ASSETS UNDER MANAGEMENT: $97,193,740

INVESTMENT PHILOSOPHY: IDS employs a "rotational" style of management, shifting among industry sectors based upon its outlook for the economy and the financial markets. The firm emphasizes primarily sector weighting decisions. Moderate market timing is also used. Over a market cycle IDS will invest in a wide range of industries. It tends to buy liquid, large capitalization stocks. While IDS will make occasional significant asset mix shifts over a market cycle, the firm is a less aggressive market timer than most rotational managers.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Growth plan not in place.
- Account load for portfolio managers is large.
- Insufficient effort to understand performance relative to an appropriate benchmark.

The firm has begun to address the third item, although additional work is needed. The first two items remain outstanding and, while not serious, should continue to be monitored.

The firm's exceptional strengths continue to be:

- Investment style consistently and successfully applied over a variety of market environments.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
IDS ADVISORY ACTUAL	-20.7%	6.6%	15.7%
IDS ADVISORY BENCHMARK	-19.5	6.1	13.9

* Annualized

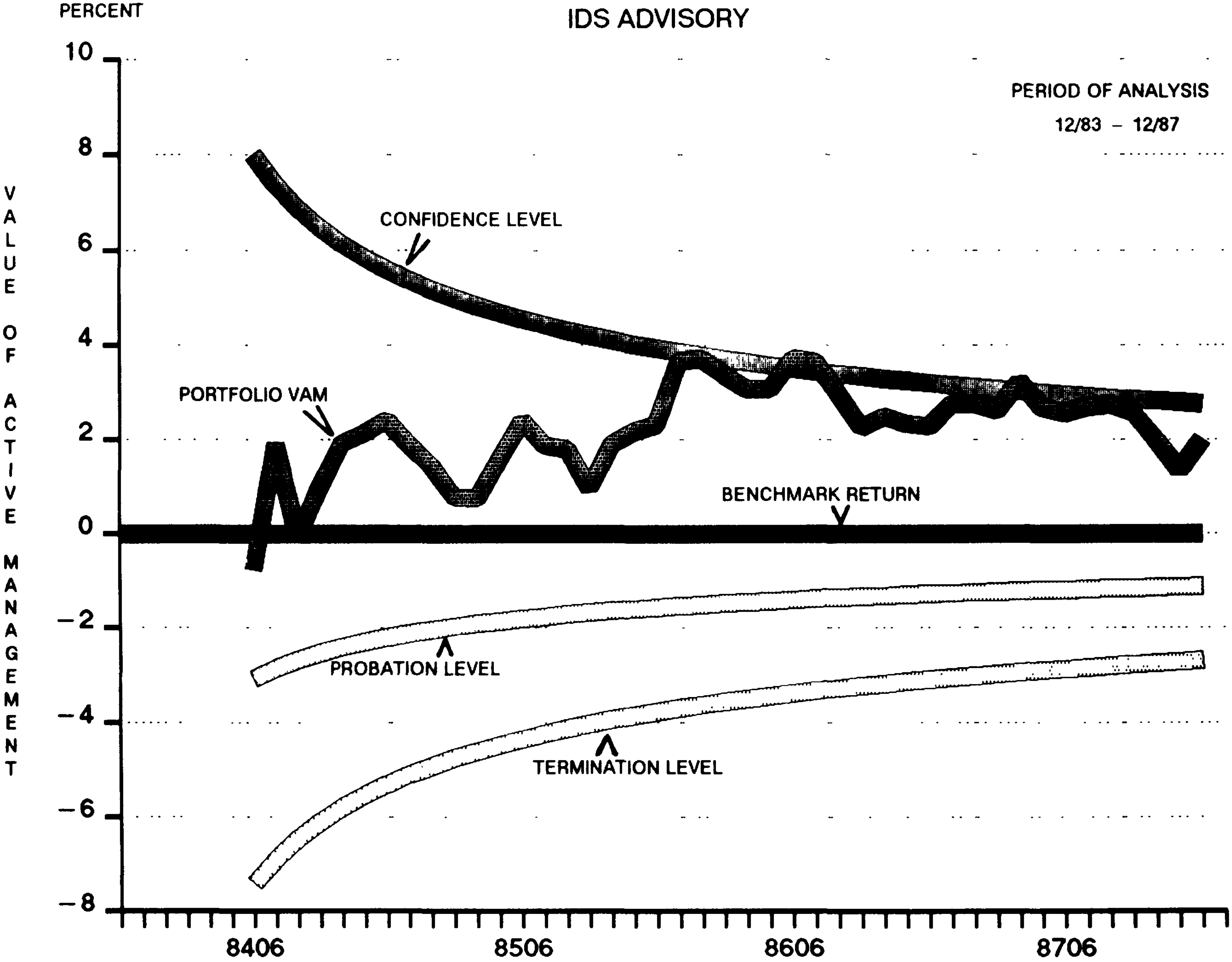
STAFF RECOMMENDATIONS:

No action required.

FIGURE 2 (cont'd)

VALUE OF ACTIVE MANAGEMENT REPORT

IDS ADVISORY



RESOLUTION OF THE
STATE BOARD OF INVESTMENT

WHEREAS, the State Board of Investment (SBI) is authorized by Minnesota Statutes section 11A.24, subdivision 4 to enter into repurchase agreements and reverse repurchase agreements; and

WHEREAS, the SBI staff recommend that the SBI from time to time enter into repurchase and reverse agreements in order to best maximize the return on short term debt securities held by the SBI; and

WHEREAS, tri-party repurchase and reverse repurchase agreements provide for greater security for the assets of the SBI by providing for perfection of the SBI's security interest in the collateral;

WHEREAS, the SBI staff has identified banks and trust companies listed in Exhibit A as capable of providing demand deposit accounts or custody accounts for the purposes of facilitating tri-party repurchase and reverse repurchase agreements; and

WHEREAS, pursuant to Minnesota Statutes section 11A.07 the SBI Executive Director is authorized to execute administrative and investment functions in conformity with the policies and directives of the SBI; and

WHEREAS, the Administrative Committee of the Investment Advisory Council has reviewed the matter and recommends the SBI authorize the Executive Director to establish accounts with such banks and trust companies as may be necessary to facilitate tri-party repurchase and reverse repurchase agreements; and

NOW THEREFORE, the SBI:

1. Authorizes the establishment of demand deposit accounts or custody accounts at any of the banks or trust companies listed in Exhibit A as the SBI Executive Director or his designee determines is necessary in order to facilitate tri-party repurchase and reverse repurchase agreemets.

2. Authorizes the SBI Executive Director or his designees to give instructions on behalf of the SBI to such banks or trust companies listed in Exhibit A with which a demand deposit account or custody account is established.

3. Authorizes the banks and trust companies listed on Exhibit A with which the SBI establishes a demand deposit account or custody account to rely on instruction to make deposits to and withdrawals from the demand deposit account or custody account provided it reasonably believes such instructions are instructions from the SBI Executive Director or his designee whether the instructions are given orally or by telex, telecopier, electronically or other means of giving instructions not manually signed or bearing a facsimile signature.

4. Directs the SBI Executive Director or his designee, to execute such authorizations or account agreements with any of the banks or trust companies as may be reasonably required to facilitate tri-party repurchase and repurchase agreements.

BE IT FURTHER RESOLVED that:

1. The Resolution shall remain in full force and effect until such time as the SBI takes action to amend or rescind this resolution.

March 2, 1988.

JOAN A. GROWE
Secretary of State, Member
State Board of Investment

EXHIBIT A

BANK OF NEW YORK

CHASE MANHATTAN BANK

CUSTODIAL TRUST COMPANY

IRVING TRUST COMPANY

MANUFACTURERS HANOVER TRUST COMPANY

MARINE MIDLAND BANK

SECURITY PACIFIC NATIONAL TRUST COMPANY

Tab E

EXECUTIVE DIRECTOR
HOWARD J. BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT

Room 105, MEA Building
55 Sherburne Avenue
St Paul, MN 55155
Tel (612) 296-3328
FAX (612) 296-9572

February 24, 1988

TO: Members, State Board of Investment
Members, Investment Advisory Council

FROM: Equity Manager Committee

SUBJECT: Committee Report

The Committee met during the quarter to review several items:

1) MANAGER CONTINUATION POLICY

The Committee reviewed the staff position paper which proposes a manager continuation policy. The policy includes a specific set of evaluation guidelines that will assist the Board in its decisions concerning retention and termination of money managers.

The manager continuation policy focuses on the level and consistency of performance as well as qualitative considerations regarding the manager's organization and investment approach.

The Committee recommends that the Board adopt the manager continuation policy for its active stock managers as presented in the paper. A copy of the position paper accompanies the Administrative Committee report.

2) REPORT FORMAT

As part of the manager continuation policy, staff has designed a performance evaluation report that incorporates the quantitative and qualitative criteria in a concise format. Staff intends to produce this report for each manager on a quarterly basis. The report would be reviewed by the IAC and presented to the Board along with staff and IAC recommendations concerning each manager.

3) MANAGER RECOMMENDATIONS

The Committee reviewed the performance valuations reports for the Board's external equity managers and concurred with the following staff recommendations:

a) Place BMI Capital on probation.

BMI's performance through 12/31/87 has breeched the probation level specified by the Value of Active Management Report.

b) Keep Beutel Goodman on probation.

Beutel Goodman was placed on probation for quantitative reasons at the November 1987 meeting. The firm's recent performance relative to its benchmark has not been strong enough to change its probation status.

c) Remove Investment Advisers from probation.

The firm was placed on probation for both qualitative and quantitative reasons at the Board meeting held on November 1987. Since that time, most of the qualitative issues have been satisfactorily resolved. Further, recent performance has been strong, moving the firm's cumulative performance above the probation level.

d) Terminate Peregrine Capital.

The firm was placed on probation for both qualitative and quantitative reasons at the November 1987 meeting. Continued poor performance and the recent departure of a key professional makes the current situation unacceptable.

e) Remove Waddell & Reed from probation.

The firm was on probation at the November 1987 meeting due primarily to an inability to construct an appropriate benchmark. This problem has been resolved.

External managers not referenced above require no action at this time. Copies of the equity manager performance evaluation reports for the period ending December 31, 1987 accompany this Committee report.

4) COMPLETENESS FUND

The Committee reviewed a staff position paper recommending the implementation of a completeness fund for the Basic Funds' common stock segment. The Committee was unable to reach a conclusion on this issue. The Committee deferred action on the staff's completeness fund recommendation until the full IAC Committee meeting scheduled for March 1, 1988.

The recommendation of the full IAC will be reported at the Board meeting on March 2, 1988.

A copy of the staff position paper describing the completeness fund concept and its application to the Basic Funds' common stock program accompanies this Committee report.

A summary of the staff recommendation regarding the completeness fund is provided below:

- Staff recommends that the Board approve the implementation of a common stock completeness fund for the Basic Retirement Funds.

- Initially, staff recommends that five percent (5%) of the Basic Funds' common stock program be allocated to the completeness fund. A 5% allocation represents approximately $150 million. Staff recommends that the assets now managed for the Basic Funds by the internal manager and the assets of the manager recommended for termination (Peregrine Capital) be re-directed from active management to the completeness fund.

- Initially, staff recommends the responsibility for implementing the completeness fund be shared between the internal manager and and outside vendor. The internal staff would be responsible for the trading of securities in the completeness fund. The outside vendor would provide the necessary technical support for the construction and on-going maintenance of the completeness fund.

- Initially, staff recommends the Board's consultant provide the necessary technical support. This support is available without additional cost to the Board under its current contract with the consultant.

Staff will continue to search for other vendors that may be able to provide these technical support services during the next quarter. Staff intends to provide recommendations to the Board concerning on-going compensation to any vendor at the June 1988 Board meeting.

BASIC RETIREMENT FUNDS

Stock Manager Performance vs. Benchmarks

Common stock manager returns are evaluated against the performance of customized indices constructed to represent the managers' specific investment approaches. These custom indices are commonly referred to as "benchmark portfolios." The benchmark portfolios take into account the equity market forces that at times favorably or unfavorably impact certain investment styles. Thus, benchmark portfolios are the appropriate bogeys against which to judge the managers' performances.

Manager performance relative to benchmarks is evaluated on a quarterly basis by the Equity Manager Committee of the Investment Advisory Council.

As a group, the common stock managers essentially matched the performance of their aggregate benchmark for the latest quarter and year. The performance of the individual stock managers was varied. Several exceeded the performance of their targets by comfortable margins, while others continued to trail their targets. A comprehensive analysis of the individual managers' performances is included in this quarter's Equity Committee Report.

Managers	Market Value 12/31/87 (Thousands)	Quarter Ending 12/31/87 Actual	Quarter Ending 12/31/87 Bmrk	Year Ending 12/31/87 Actual	Year Ending 12/31/87 Bmrk	(Annualized) Since 1/1/84 Actual	(Annualized) Since 1/1/84 Bmrk
Alger	$ 84,456	-24.2%	-24.6%	-2.7%	2.8%	10.1%	11.2%
Alliance	100,391	-21.4	-24.2	16.0	1.0	17.6	10.2
Beutel	94,026	-23.4	-23.5	3.0	2.9	10.5	13.8
BMI	50,881	-30.2	-25.3	-8.3	-2.9	4.5	8.1
Forstmann	81,706	-17.6	-16.2	8.8	3.7	14.7	12.1
Hellman	71,015	-21.9	-20.8	7.2	4.3	13.7	13.2
IDS	82,531	-20.7	-19.5	6.7	5.4	15.8	13.5
IAI	80,014	-15.2	-18.9	14.9	6.5	14.6	13.8
Lieber	31,999	-23.0	-24.9	-6.5	-5.7	9.5	7.6
Peregrine	73,744	-20.8	-21.6	-2.1	0.7	N.A.	N.A.
Waddell	85,799	-20.8	-21.3	5.5	5.9	10.5	8.9
Internal	95,831	-24.3	-21.6	-3.4	6.2	N.A.	N.A.
Wilshire	1,690,614	-23.0	-22.8	1.9	2.4	12.7	12.8
Stock Segment	$2,623,007	-22.6%	-22.4%	2.6%	2.4%	12.4%	12.6%
Wilshire 5000		-23.1%		2.3%		12.9%	

PERFORMANCE EVALUATION REPORT
FRED ALGER MANAGEMENT
4th Quarter, 1987

PORTFOLIO MANAGER: David Alger

ASSETS UNDER MANAGEMENT: $99,460,858

INVESTMENT PHILOSOPHY: Fred Alger searches for companies expected to experience above-consensus earnings gains. These earnings gains may be either cyclical or secular. The firm focuses on two types of companies: first, companies whose products are expected to produce high consistent unit volume growth rates; and, second, companies undergoing a positive life cycle change not yet fully recognized by the market. The proportion of the total portfolio invested in these two types of companies varies over time. On average, however, the high unit growth companies tend to dominate the total portfolio. Fred Alger is not an active market timer, usually maintaining a fully invested position.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Attempts to move outside of traditional investment business.
- Insufficient effort to understand performance relative to an appropriate benchmark.
- Growth plan not in place.
- Relatively high commission costs.

The first two items have been satisfactorily resolved. The latter two are still under discussion.

The firm's exceptional strengths continue to be:

- Highly successful and experienced professionals.
- Organizational continuity and strong leadership.
- Extensive securities research process.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
FRED ALGER ACTUAL	-24.2%	-2.7%	10.1%
FRED ALGER BENCHMARK	-24.6	2.8	11.2

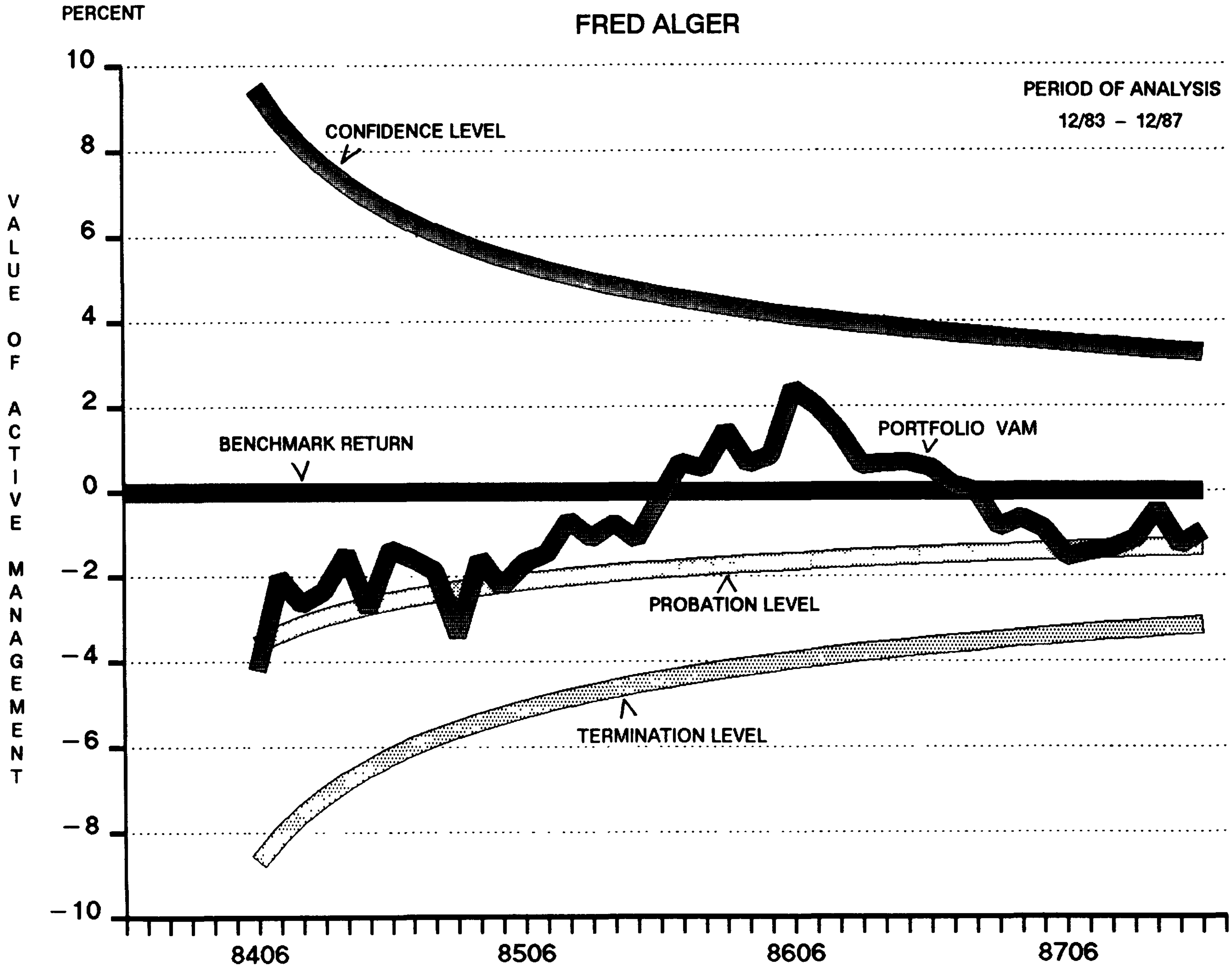
* Annualized

STAFF RECOMMENDATIONS:

No action required.

VALUE OF ACTIVE MANAGEMENT REPORT

FRED ALGER



PERFORMANCE EVALUATION REPORT
ALLIANCE CAPITAL MANAGEMENT
4th Quarter, 1987

PORTFOLIO MANAGER: Jack Koltes

ASSETS UNDER MANAGEMENT: $118,226,763

INVESTMENT PHILOSOPHY: Alliance searches for companies likely to experience high rates of earnings growth, on either a cyclical or secular basis. Alliance has invested in a wide range of growth opportunities from small, emerging growth to large, cyclically sensitive companies. There is no clear distinction on the part of the firm as to an emphasis on one particular type of growth company over another. However, the firm's decision-making process appears to be much more oriented toward macroeconomic considerations than is the case with most other growth managers. Accordingly, cyclical earnings prospects, rather than secular, growth opportunities appear to play a larger role in terms of stock selection. Alliance is not an active market timer, rarely raising cash above minimal levels.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Growth plan not in place.
- Asset growth significant in recent years.
- Insufficient effort to understand performance relative to an appropriate benchmark.

These issues, while not serious, remain outstanding.

The firm's exceptional strengths continue to be:

- Highly successful and experienced professionals.
- Organizational continuity and strong leadership.
- Well-acquainted with needs of large clients.
- Investment style consistently and successfully applied over a variety of market environments.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
ALLIANCE CAPITAL ACTUAL	-21.4%	16.0%	17.6%
ALLIANCE CAPITAL BENCHMARK	-24.2	1.0	10.2

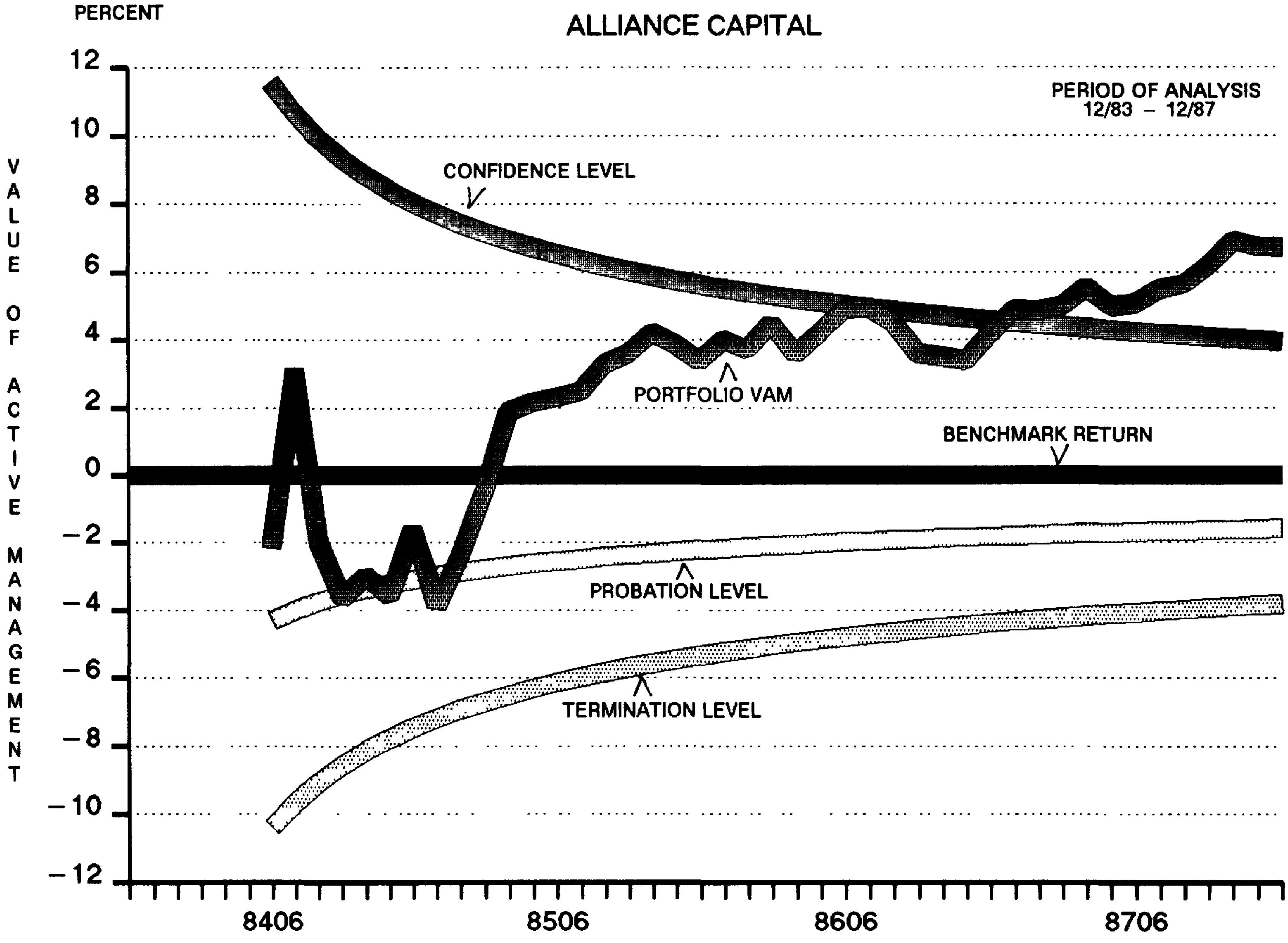
* Annualized

STAFF RECOMMENDATIONS:

No action required.

VALUE OF ACTIVE MANAGEMENT REPORT

ALLIANCE CAPITAL



PERFORMANCE EVALUATION REPORT
BMI CAPITAL MANAGEMENT
4th Quarter, 1987

PORTFOLIO MANAGER: Frank Houghton, James Awad

ASSETS UNDER MANAGEMENT: $59,920,930

INVESTMENT PHILOSOPHY: BMI's investment approach focuses on companies expected to exhibit strong sustained earnings gains. BMI attempts to identify two types of "growth" companies: first, misperceived companies that are in the process of undergoing dynamic changes that will cause them to produce materially higher earnings over the near-term; and, second, small-to-medium sized companies that exhibit the potential for rapid future earnings growth. The weighting of the two types of growth companies within the firm's portfolio will vary over time depending upon economic and financial conditions. Generally, however, the misperceived companies will make up the majority of the portfolio. On the other hand, the smaller high growth companies tend to dominate the portfolio's risk characteristics. The firm concentrates almost exclusively on stock selection, only rarely raising cash to significant levels.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Number of new professionals added in recent years.
- Lack of clearly identifiable leadership.

These issues, while not serious, warrant continued monitoring.

The firm's exceptional strengths continue to be:

- Extensive securities research process.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
BMI CAPITAL ACTUAL	-30.2%	-8.3%	4.5%
BMI CAPITAL BENCHMARK	-25.3	-2.9	8.1

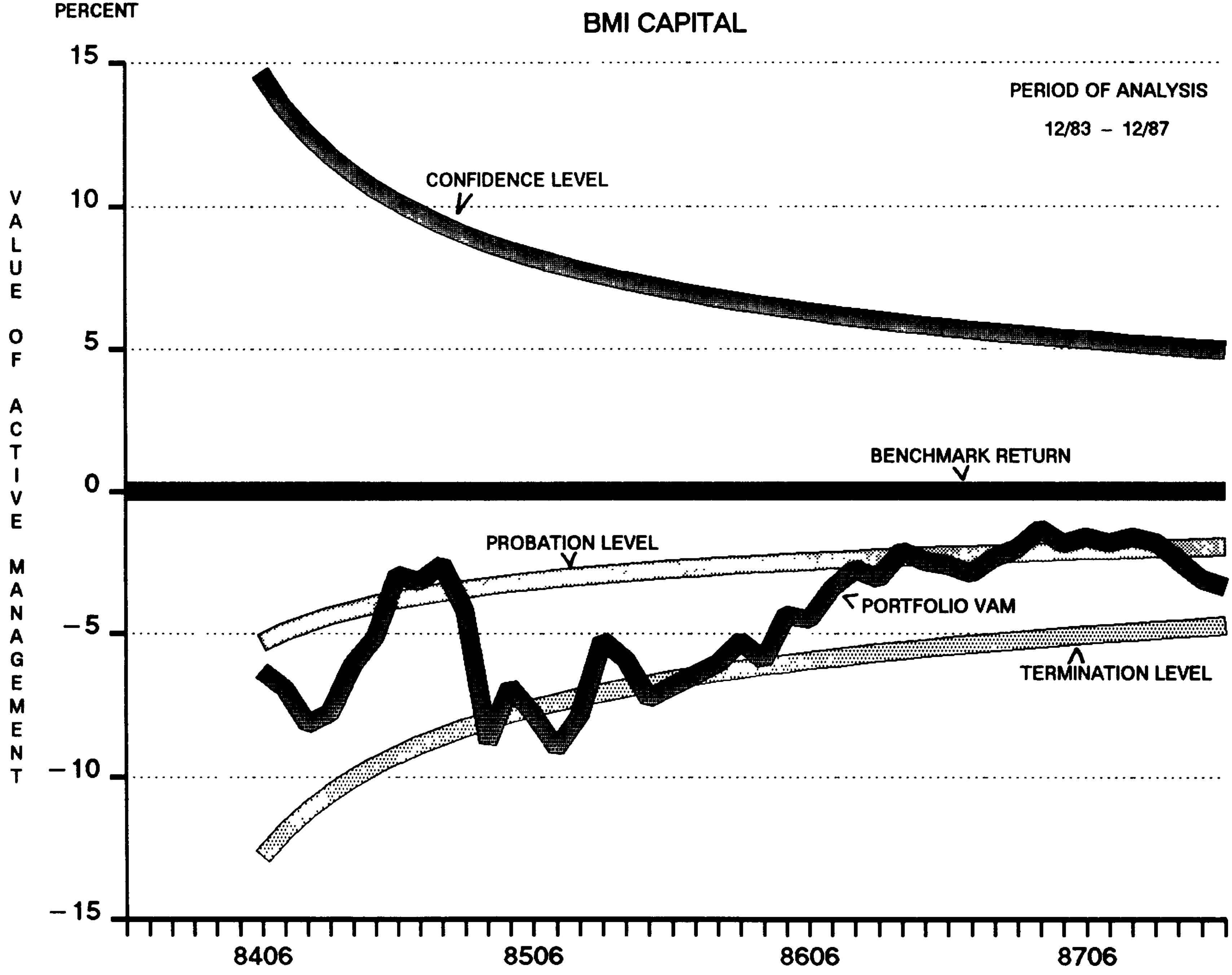
* Annualized

STAFF RECOMMENDATIONS:

Place on probation for performance reasons. The firm's performance has deteriorated recently, reversing a previously positive trend.

VALUE OF ACTIVE MANAGEMENT REPORT

BMI CAPITAL



PERFORMANCE EVALUATION REPORT
BEUTEL GOODMAN CAPITAL MANAGEMENT
4th Quarter, 1987

PORTFOLIO MANAGER: Richard Andrews, Robert McFarland

ASSETS UNDER MANAGEMENT: $110,731,055

INVESTMENT PHILOSOPHY: Beutel Goodman searches for companies whose stock prices are low in comparison to estimated tangible book value or companies whose P/E's are low in relation to earnings quality and expected earnings growth. This "value" investment approach is contrarian and defensive by nature. The firm tends to make concentrated bets in stocks it perceives to be undervalued. Beutel Goodman is not an active market timer and is almost always fully invested.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Addition of several new professionals.
- Decision-making hierarchy among portfolio managers unclear.
- Significant account loss in recent years.

These concerns have been discussed with the firm. The first two items have been explained to staff's satisfaction. The third item remains outstanding.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
BEUTEL GOODMAN ACTUAL	-23.4%	3.0%	10.5%
BEUTEL GOODMAN BENCHMARK	-23.5	2.9	13.8

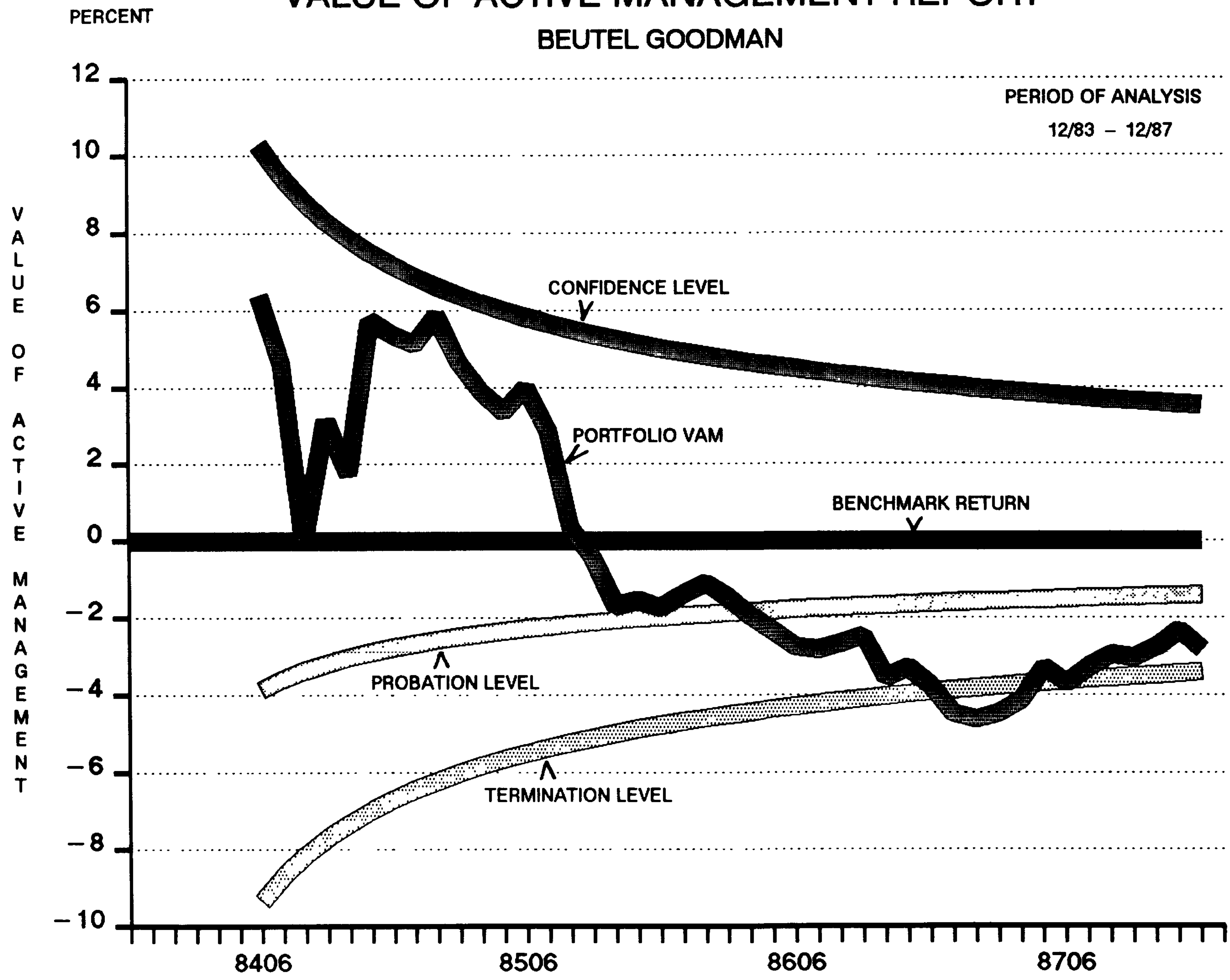
* Annualized

STAFF RECOMMENDATIONS:

The firm was placed on probation for performance reasons. The firm's recent performance relative to its benchmark has not been sufficiently strong to change its probation status.

VALUE OF ACTIVE MANAGEMENT REPORT

BEUTEL GOODMAN



PERFORMANCE EVALUATION REPORT
FORSTMANN-LEFF ASSOCIATES
4th Quarter, 1987

PORTFOLIO MANAGER: Joel Leff

ASSETS UNDER MANAGEMENT: $96,222,605

INVESTMENT PHILOSOPHY: Forstmann Leff is a classic example of a "rotational" manager. The firm focuses almost exclusively on asset mix and sector weighting decisions. Based upon its macroeconomic outlook, the firm will move aggressively into and out of asset classes and equity sectors over the course of a market cycle. The firm tends to purchase liquid, large capitalization stocks. Forstmann Leff will make sizable market timing moves at any point during a market cycle.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Insufficient effort to understand performance relative to an appropriate benchmark.
- Significant account loss in recent years.
- Relatively high turnover among firm's professionals.
- Valuation process not clearly defined.

The first two issues have been satisfactorily addressed. The latter two, while not serious, remain outstanding.

Recently, the British firm which owns Forstmann-Leff experienced an ownership change. No adverse impact on Forstmann-Leff's operations is expected.

The firm's exceptional strengths continue to be:

- Highly successful and experienced professionals.
- Investment style consistently and successfully applied over a variety of market environments.
- Well-acquainted with needs of large clients.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
FORSTMANN-LEFF ACTUAL	-17.6%	8.8%	14.7%
FORSTMANN-LEFF BENCHMARK	-16.2	3.7	12.1

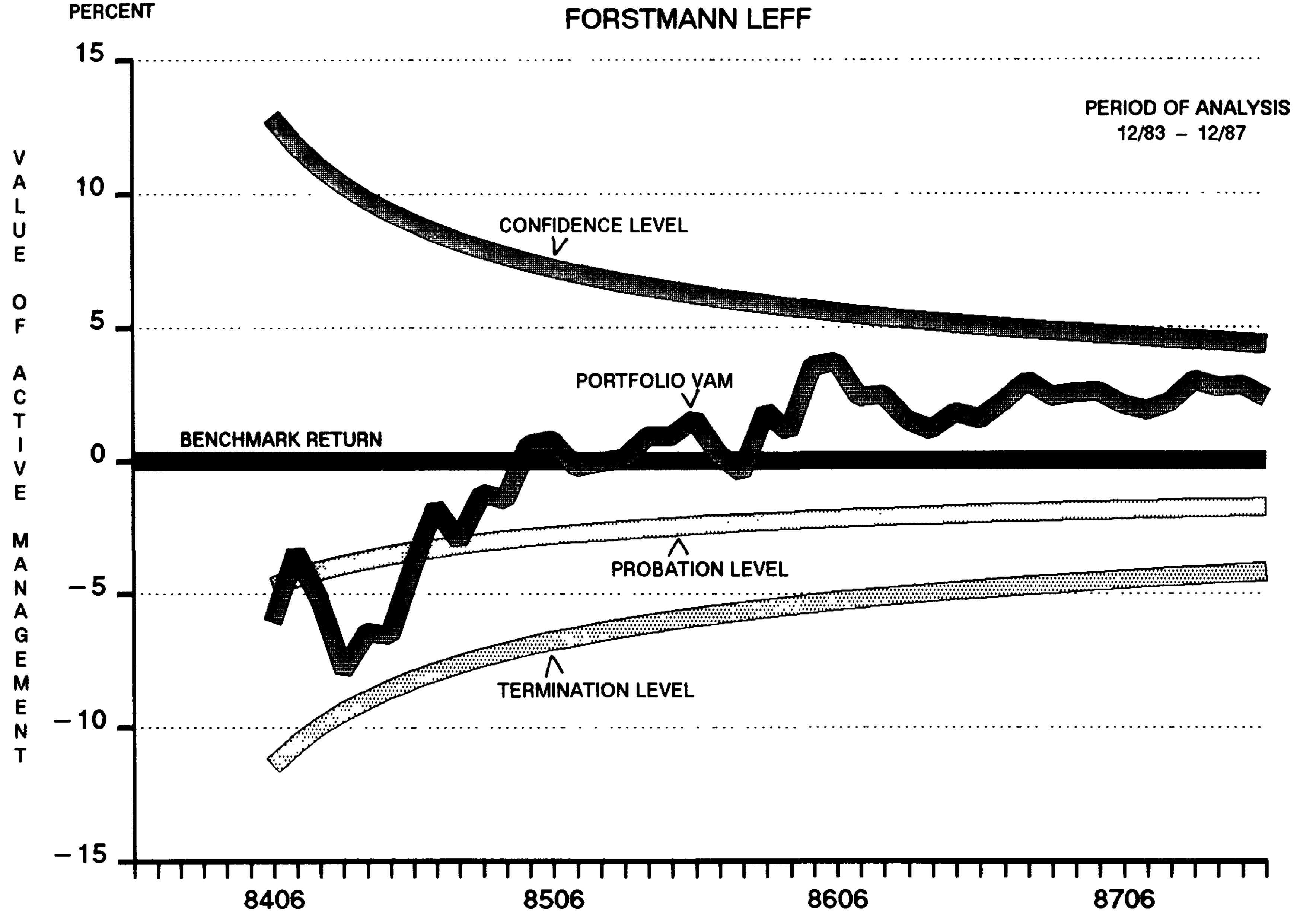
* Annualized

STAFF RECOMMENDATIONS:

No action required.

VALUE OF ACTIVE MANAGEMENT REPORT

FORSTMANN LEFF



PERFORMANCE EVALUATION REPORT
IDS ADVISORY
4th Quarter, 1987

PORTFOLIO MANAGER: Mitzi Malevich

ASSETS UNDER MANAGEMENT: $97,193,740

INVESTMENT PHILOSOPHY: IDS employs a "rotational" style of management, shifting among industry sectors based upon its outlook for the economy and the financial markets. The firm emphasizes primarily sector weighting decisions. Moderate market timing is also used. Over a market cycle IDS will invest in a wide range of industries. It tends to buy liquid, large capitalization stocks. While IDS will make occasional significant asset mix shifts over a market cycle, the firm is a less aggressive market timer than most rotational managers.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- o Growth plan not in place.
- o Account load for portfolio managers is large.
- o Insufficient effort to understand performance relative to an appropriate benchmark.

The firm has begun to address the third item, although additional work is needed. The first two items remain outstanding and, while not serious, should continue to be monitored.

The firm's exceptional strengths continue to be:

- o Investment style consistently and successfully applied over a variety of market environments.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
IDS ADVISORY ACTUAL	-20.7%	6.7%	15.8%
IDS ADVISORY BENCHMARK	-19.5	5.4	13.5

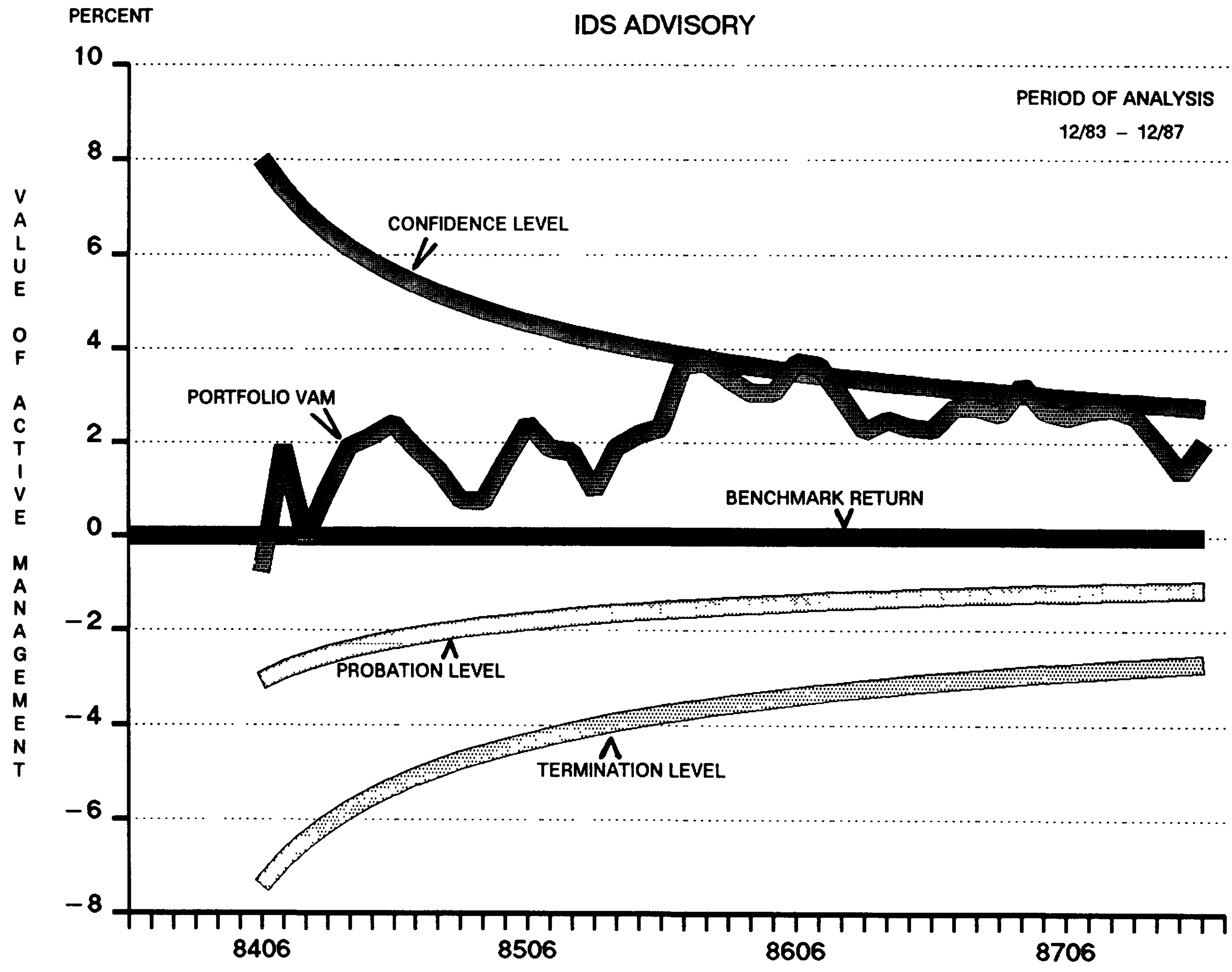
* Annualized

STAFF RECOMMENDATIONS:

No action required.

VALUE OF ACTIVE MANAGEMENT REPORT

IDS ADVISORY



PERFORMANCE EVALUATION REPORT
INVESTMENT ADVISERS
4th Quarter, 1987

PORTFOLIO MANAGER: Charles Webster

ASSETS UNDER MANAGEMENT: $81,868,012

INVESTMENT PHILOSOPHY: Investment Advisers is a "rotational" manager. Its macroeconomic forecasts drive its investment decision-making. The firm emphasizes market timing and sector weighting decisions. Investment Advisers will invest in a wide range of industries over a market cycle. It tends to hold liquid, medium to large capitalization stocks. The firm is an active market timer, willing to make gradual but significant asset mix shifts over a market cycle.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Growth plan not in place.
- Lack of familiarity with needs of large institutional clients.
- Insufficient effort to understand performance relative to an appropriate benchmark.

After meeting with the firm, staff believes the last two items are now being adequately addressed. The first item, while not serious, warrants additional monitoring.

The firm's exceptional strengths continue to be:

- Investment style consistently applied over a variety of market environments.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
INVESTMENT ADVISERS ACTUAL	-15.2%	14.9%	14.6%
INVESTMENT ADVISERS BENCHMARK	-18.9	6.5	13.8

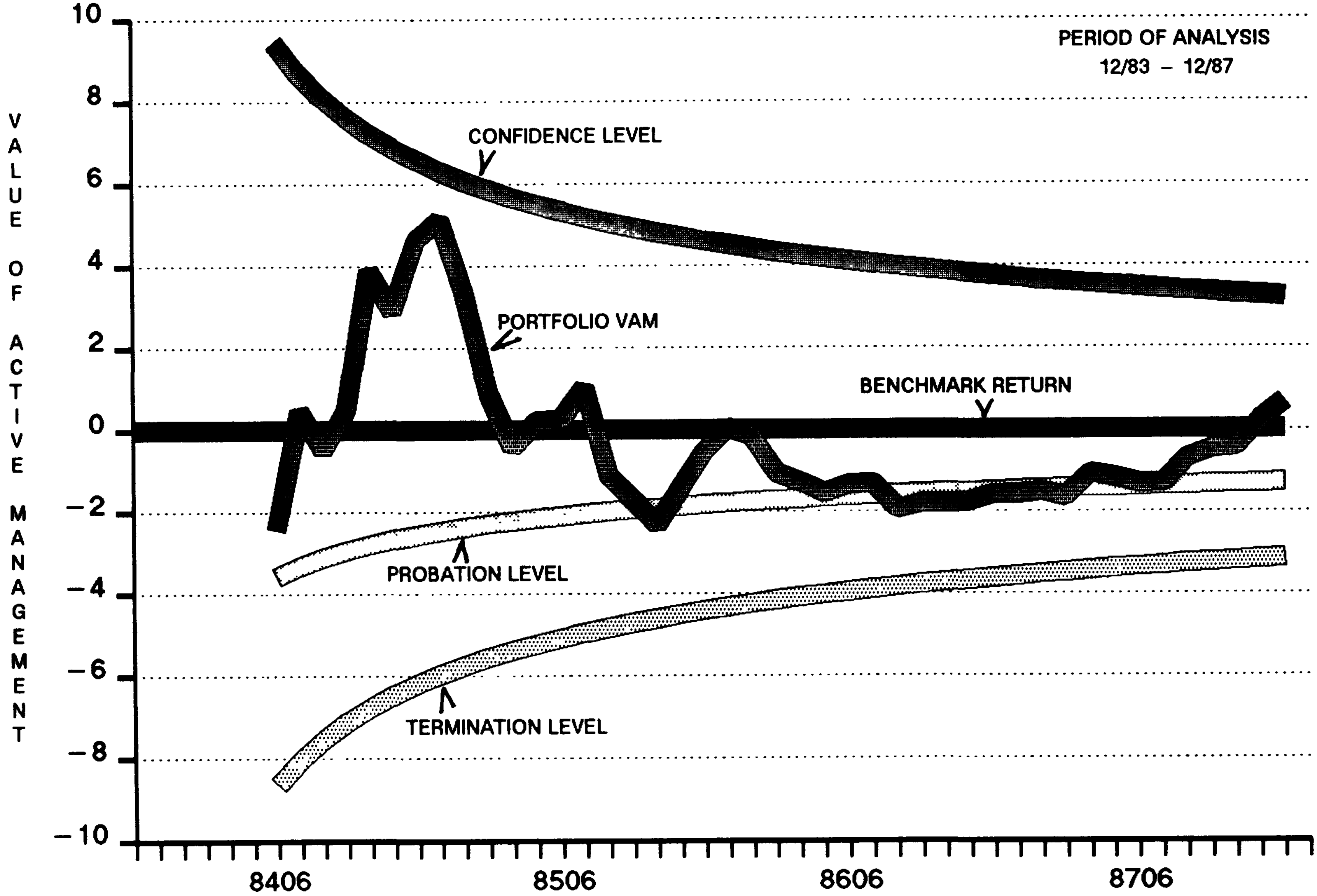
* Annualized

STAFF RECOMMENDATIONS:

Remove from probation. The firm was placed on probation for both qualitative and quantitative reasons. Since that time, most of the qualitative issues have been satisfactorily resolved. Further, recent performance has been strong, moving the firm's cumulative performance above the probation level.

VALUE OF ACTIVE MANAGEMENT REPORT

INVESTMENT ADVISERS



PERFORMANCE EVALUATION REPORT
LIEBER & COMPANY
4th Quarter, 1987

PORTFOLIO MANAGER: Stephen Lieber, Nola Falcone

ASSETS UNDER MANAGEMENT: $37,684,659

INVESTMENT PHILOSOPHY: Lieber and Co. seeks to identify investment concepts that are either currently profitable, or likely to become so in the near future, yet whose prospects are not reflected in the stock prices of the companies associated with the concepts. The investment concepts upon which the firm focuses are related to both macroeconomic trends and specific product developments within particular industries or companies. Stocks purchased by Lieber tend to be those of well-managed, high growth and high return on equity, small-to-medium sized companies. The stocks may be undervalued due to the failure of investors to recognize fully either the value of new products or a successful turnaround situation. Particularly attractive to Lieber are small-to-medium sized takeover candidates. The firm generally is fully invested, with any cash positions the result of a lack of attractive investment concepts.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- o Firm is unfamiliar with needs of large clients.
- o No analysis of performance relative to benchmark.

These items remain outstanding, despite attempts to resolve them.

The firm's exceptional strengths continue to be:

- o Organizational continuity and strong leadership.
- o Attractive, unique investment approach.
- o Investment style consistently and successfully applied over a variety of market environments.
- o Extensive securities research process.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
LIEBER & COMPANY ACTUAL	-23.0%	-6.5%	9.5%
LIEBER & COMPANY BENCHMARK	-24.9	-5.7	7.6

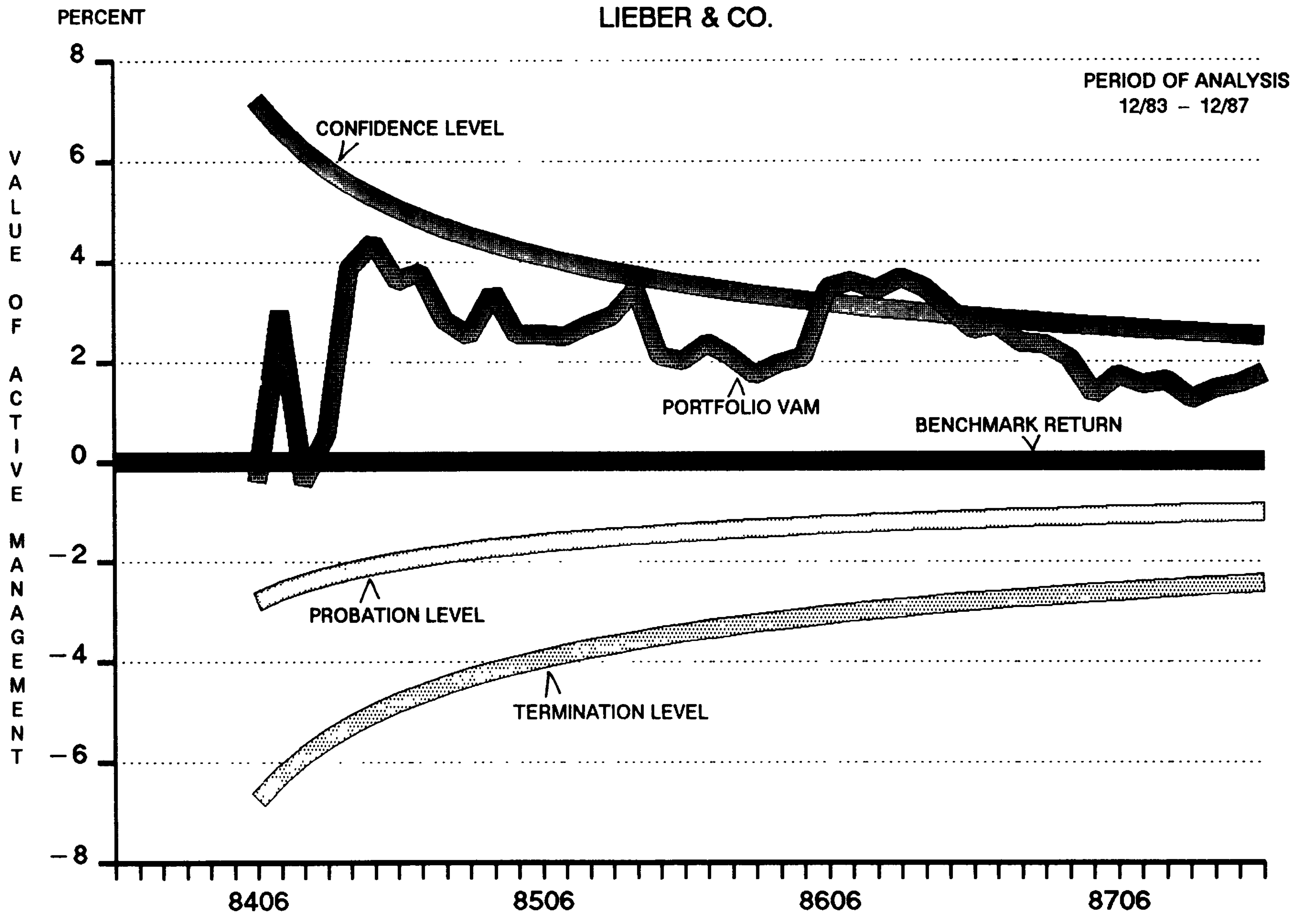
* Annualized

STAFF RECOMMENDATIONS:

No action required.

VALUE OF ACTIVE MANAGEMENT REPORT

LIEBER & CO.



PERFORMANCE EVALUATION REPORT
PEREGRINE CAPITAL MANAGEMENT
4th Quarter, 1987

PORTFOLIO MANAGER: Tim Kaspar

ASSETS UNDER MANAGEMENT: $86,846,302

INVESTMENT PHILOSOPHY: Peregrine is a contrarian investor searching for poorly performing stocks that have been "oversold" by the market. The firm expects that the prices of these stocks will rebound as the market's "emotional excesses" come to be recognized. The firm is very price sensitive. As a result it is an active trader, buying stocks as their performance relative to the market declines and selling stocks as relative performance rises. Peregrine tends to hold small positions in a large number of stocks, avoiding significant bets on individual issues. The firm is a moderate market timer, alternating its cash position incrementally around a moderately low cash position.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- Lack of strong leadership and clear decision-making hierarchy.
- Inconsistent application of investment style.
- Valuation process not clearly defined.

These items remain outstanding. Further, since the last evaluation, one of the firm's key professionals has left.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 6/30/85*
PEREGRINE ACTUAL	-20.8%	-2.1%	6.5%
PEREGRINE BENCHMARK	-21.6	0.7	10.6

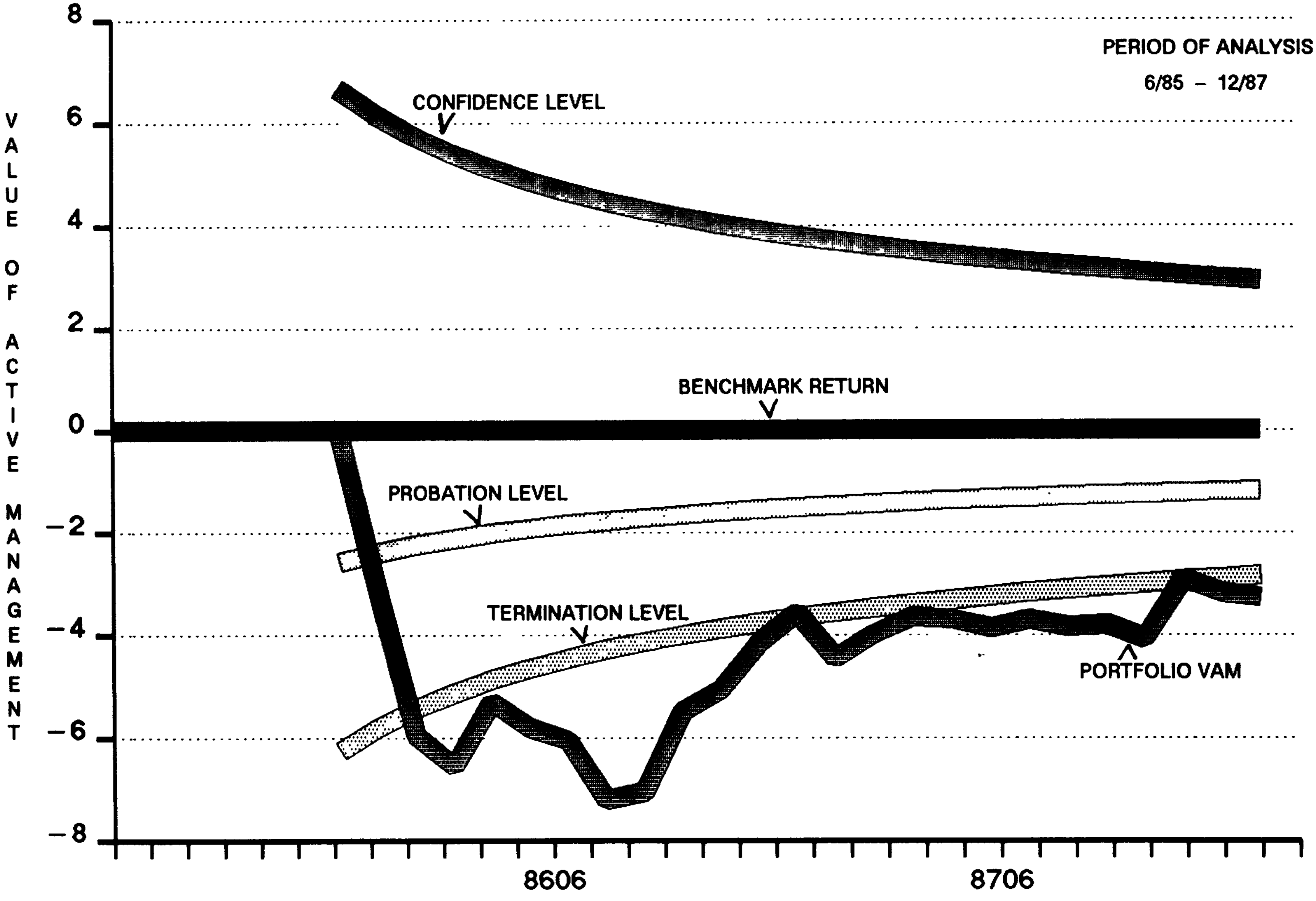
* Annualized

STAFF RECOMMENDATIONS:

Terminate as a manager. The firm had been on probation for both qualitative and performance reasons. Particularly with the recent departure of a key professional, the current situation is unacceptable.

VALUE OF ACTIVE MANAGEMENT REPORT

PEREGRINE CAPITAL



PERFORMANCE EVALUATION REPORT
WADDELL & REED
4th Quarter, 1987

PORTFOLIO MANAGER: Henry Herrmann

ASSETS UNDER MANAGEMENT: $101,042,527

INVESTMENT PHILOSOPHY: Waddell & Reed focuses its attention primarily on smaller capitalization growth stocks, although the firm has been very eclectic in its choice of stocks in recent years. However, the firm has demonstrated a willingness to make significant bets against this investment approach for extended periods of time. The firm is an active market timer and will raise cash to extreme levels at various points in the market cycle.

QUALITATIVE EVALUATION (REPORTED BY EXCEPTION):

The previous evaluation noted several items of concern:

- o Firm not familiar with needs of large clients.
- o Appropriate benchmark not constructed.
- o Insufficient effort to understand performance relative to an appropriate benchmark.
- o Valuation process not well-defined.

The first two issues have been satisfactorily addressed. The last two issues warrant further monitoring.

The firm's exceptional strengths continue to be:

- o Highly successful and experienced professionals.

QUANTITATIVE EVALUATION: (See Value of Active Management graph below)

PERFORMANCE RELATIVE TO BENCHMARK

	LATEST QUARTER	LATEST YEAR	SINCE 12/31/83*
WADDELL & REED ACTUAL	-20.8%	5.5%	10.5%
WADDELL & REED BENCHMARK	-21.3	5.9	8.9

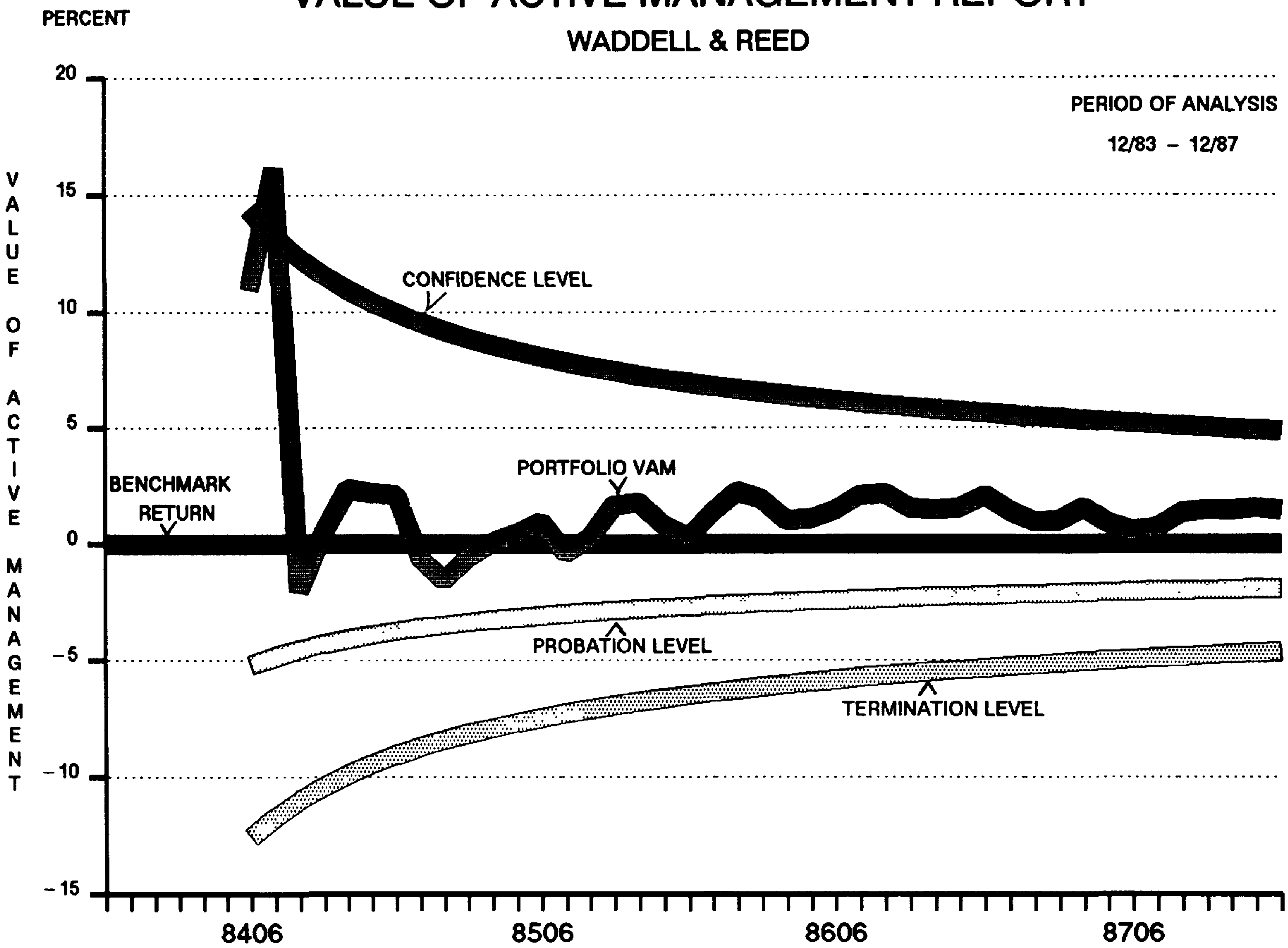
* Annualized

STAFF RECOMMENDATIONS:

Remove from probation. The firm was on probation due primarily to an inability to construct an appropriate benchmark. This problem has been resolved.

VALUE OF ACTIVE MANAGEMENT REPORT

WADDELL & REED



COMPLETENESS FUND

Staff Position Paper
February 1988

EXECUTIVE SUMMARY

The Basic Retirement Funds are managed in a similar fashion to many other large pension funds in that the common stock and bond components use both active and passive management. Further, the Basic Funds employ a number of specialized active managers pursuing a variety investment styles within each asset class. These active managers are hired for their anticipated ability to produce superior performance within their specific areas of expertise.

Active management offers the potential for the Basic Funds' common stock component to exceed the returns of its asset class target, the Wilshire 5000. However, the pursuit of superior performance through active management carries with it the risk of underperforming the Wilshire 5000.

This underperformance results from two sources:

- The active managers perform poorly relative to their benchmarks. This source of underperformance is the most familar to performance evaluators.
- The active managers individually perform well within their areas of expertise. However, the active managers' investment styles, in aggregate, over or underemphasize certain segments of the Wilshire 5000. The underemphasized segments perform relatively well while the overemphasized segments perform poorly.

The active managers' over or underemphases of segments within the Wilshire 5000, and the possibility that this may result in the Basic Funds' common stock portfolio underperforming the Wilshire 5000, is called misfit risk. Misfit risk is unintentional. Further, it is unproductive in that there is no expectation of enhanced returns associated with assuming misfit risk. Therefore, the Board should seek to minimize misfit risk.

The role of a completeness fund is to control misfit risk. A completeness fund accomplishes this objective by adjusting the Basic Funds' common stock portfolio to offset the misfit present in the aggregate investment style of the Board's common stock managers. The completeness fund offers two primary benefits:

- o Improves the ability of the Basic Funds' common stock program to consistently outperform the Wilshire 5000. The completeness fund reduces the risk that the value added by the active managers is offset by the negative impact of misfit.

- o Adjusts for changing risk characteristics in the common stock portfolio due to changes in the active manager line-up. This allows the Board to focus on hiring active managers for their ability to add value rather than for the coverage provided by their specialized area.

Constructing a common stock completeness fund for the Basic Funds involves eight basic steps.

- o Step 1. Select a common stock asset class target. The Board already has selected the Wilshire 5000 as the common stock asset class target.

- o Step 2. Express the Wilshire 5000 as an investable list of securities. Ineligible stocks, such as liquor and tobacco stocks, are removed.

- o Step 3. Build appropriate benchmark portfolios for each of the Board's common stock managers. These benchmarks reflect the managers' investment styles.

- o Step 4. Combine the managers' benchmark portfolios into an aggregate benchmark portfolio.

- o Step 5. Compare the aggregate benchmark portfolio to the Wilshire 5000 and identify the differences. These differences represent misfit.

- o Step 6. Specify a list of completeness fund securities to reduce the misfit to acceptable levels.
- o Step 7. Periodically rebalance the completeness fund.
- o Step 8. Monitor the performance of the completeness fund manager.

Staff has conducted research into the amount of misfit risk present in the Basic Funds' common stock component. Currently, that misfit risk is approximately 0.9% per annum. That is, in any given year the Basic Funds' are likely to outperform or underperform the Wilshire 5000 by almost 1% due solely to misfit.

Staff does not view this current level of misfit as cause for significant concern. The diversity of investment styles among the Board's active managers, combined with the sizable allocation to the index fund, results in broad coverage of the Wilshire 5000. Nevertheless, the current level of misfit is not trivial. Further, if the current group of managers were altered, the misfit could increase. Therefore, staff proposes that a completeness fund be implemented as an adjunct to the active manager program.

Staff recommends that 5% of the Basic Funds' common stock component, or approximately $150 million, be allocated to a completeness fund. This allocation is expected to reduce misfit risk by approximately 22%. Staff further recommends that the assets now managed for the Basic Funds by the internal manager be redirected from active management to the completeness fund.

Staff also recommends that responsibility for maintaining the completeness fund be divided between an outside vendor and internal staff. The outside vendor would supply the sophisticated computer software and databases required to construct the list of completeness fund securities. Staff recommends that, at least initially, the Board's consultant provide the necessary technical support. Internal staff would provide for the daily management of the completeness fund and, in particular, carry out the necessary security trading. A similar arrangement has proven successful and cost-effective in the management of the Post Retirement Fund's dedicated bond portfolio.

For the present, the Board's consultant can provide the necessary technical support under its current contract. As a result, the completeness fund can be constructed initially without incurring additional management costs to the Basic Funds.

If the completeness fund is approved, staff will continue to search for these technical support services during the next quarter. Staff intends to provide recommendations to the Board concerning on-going compensation to any vendor at the June 1988 Board meeting.

I. INTRODUCTION

RISK MANAGEMENT

Investors are willing to incur risk because they expect to be compensated with enhanced returns. One of the primary responsibilities of pension plan sponsors is to manage this risk-return trade-off. For large pension plans, the risk management process can be a complex undertaking.

A pension plan's risk management begins with the identification of the plan's investment objectives. These objectives are then translated into a policy asset mix. A policy asset mix specifies the long-run allocation of the plan's assets among a number of broad asset classes (e.g., stocks and bonds).

Given a policy asset mix, the risk management process proceeds with the establishment of an investment management structure for each asset class in the policy asset mix. An investment management structure describes the alignment of investment approaches designed to achieve the desired risk-return objectives for a particular asset class.

The policy asset mix and common stock and bond investment management structures of the Basic Retirement Funds are delineated in a comprehensive investment policy statement adopted by the Board in 1987. (For further information, see Parts II and III of the Basic Funds' investment policy paper.)

PASSIVE AND ACTIVE MANAGEMENT

In establishing an investment management structure, two basic investment approaches are available to a plan sponsor. These two approaches entail different sets of performance expectations.

- o Passive Management. Buying and holding a diversified portfolio of securities within the asset class. Performance is expected to match that of the asset class.

- o Active Management. Buying and selling securities with the expectation of exceeding the returns on the passive alternative.

Because it offers the potential to exceed the returns from passive management, active management also exposes a pension plan to the possibility of underperforming passive results. The risk of active management underperforming passive management is referred to as active risk. As part of the risk management process, a plan sponsor must determine how much active risk it is willing to accept in each asset class.

Among institutional investors, the most common approach to active management consists of retaining a group of specialized money managers. As specialists, each manager pursues an investment style which focuses on specific segments of a particular asset class. (For example, among specialized common stock managers, some managers focus on small capitalization stocks. Others concentrate on stocks with low price-earnings ratios.) Specialized managers are hired with the expectation that they will produce returns that exceed a passive investment in their particular areas of expertise.

Similar to many other large pension plans, the Basic Funds' common stock and bond investment management structures use both active and passive management. Further, the Basic Funds employ a number of specialized active managers pursuing various investment styles within each asset class. (The rationale for the allocation to passive and active management, as well as the use of specialized active managers, is discussed in Part III of the Basic Funds' investment policy paper.)

MISFIT RISK

Clearly, a pension plan that uses both active and passive management can produce superior performance only if the active managers, as a whole, perform better than the passive alternative. But is it possible for all of the specialized active managers to produce superior returns within their individual areas of expertise, and yet, as a whole, underperform the passive alternative? The answer is "Yes," if the combined investment styles of the active managers overlook certain segments of the asset class (e.g., particular industries) or concentrate too heavily in others.

For example, the pension plan's specialized common stock managers may all follow investment styles that ignore utility stocks. If utility stocks produce exceptionally strong returns, the plan's common stock performance will suffer compared to the broad stock market. Yet each specialized manager may have performed well within its area of expertise.

These over or underemphases of segments within an asset class, and the possibility that they may result in underperforming the passive alternative, is called misfit risk. Misfit risk is unintentional. Further, it is unproductive in that there is no expectation of enhanced returns associated with incurring misfit risk. Therefore, the risk management process should seek to minimize misfit risk.

The purpose of this position paper is to describe how misfit risk can be controlled through the use of a completeness fund. Specifically, this paper:

- o Develops various basic completeness fund concepts.
- o Outlines the completeness fund construction process.
- o Describes the evaluation of the completeness manager's performance.
- o Analyzes the misfit risk present in the Basic Funds' common stock component.
- o Makes recommendations for implementing a common stock completeness fund in the Basic Funds.

II. BASIC COMPLETENESS FUND CONCEPTS

To better understand the nature of the problem that a completeness fund is intended to solve, a discussion of several basic concepts is helpful.

ASSET CLASS TARGET

An asset class target is a diversified collection of securities within a particular asset class. It represents the set of feasible investment opportunities that the plan sponsor believes best achieve the purposes for which the asset class is included in the policy asset mix.

The asset class target chosen for the Basic Funds' common stock component is the Wilshire 5000. The Wilshire 5000 is a broad stock market index representing, with few exceptions, the full range of available domestic common stock investments.

As the common stock asset class target, the Wilshire 5000 is the standard by which the results of the Basic Funds' common stock component are judged. The returns on the Wilshire 5000 can be thought of as a threshold performance expectation. Through active management, the Board desires to exceed this performance target.

For purposes of designing a completeness fund, the specification of the asset class target involves:

- o A specific list of stocks. This list must satisfy any eligibility requirements established by the plan sponsor, such as minimum market capitalization or prohibited securities (e.g., stocks in the liquor and tobacco industries).

- o A method of assigning weights to the stocks in the list. In the case of the Wilshire 5000, a capitalization weighting system is used.

- o A normal cash position. This cash component recognizes that, in practice, managers' portfolios are rarely fully invested. This occurs because of the continuous receipt of dividends and the need to maintain a cash balance to complete transactions.

PASSIVE AND ACTIVE COMPONENTS

A passively managed asset class portfolio is referred to as an index fund. An index fund is designed to match the performance of its asset class target. Properly constructed, an index fund should not outperform its asset class target, but equivalently, neither should it materially underperform the target. The Basic Funds' common stock index fund is designed to track the performance of the Wilshire 5000.

Active management can take many forms, but all involve identifying and trading securities that are perceived to be misvalued in an attempt to outperform the asset class target. Further, all forms of active management imply creating portfolios that intentionally differ in some manner from the composition of the asset class target. Only by these deviations (referred to as active bets) can active management add value to the asset class target's return.

As discussed earlier, the Board's active common stock component is a multiple manager configuration. The Board currently employs ten active managers, each with specialized skills. These managers were hired for their anticipated ability to produce superior results within their specific segments of the stock market. In other words, the managers are expected to add value to their investment styles.

BENCHMARK PORTFOLIOS

A benchmark portfolio represents a manager's area of expertise, or investment style. Specialized managers have distinct preferences for certain types of securities. A benchmark portfolio represents these preferences. It is a collection of securities, appropriately weighted, from which the manager generally makes portfolio selections. As in the case of an asset class target, a manager's benchmark is defined by a specific list of stocks, weights assigned to each stock, and a normal cash position.

A manager's benchmark portfolio serves two important roles in the completeness fund process. First, it represents the standard against which to evaluate the manager's investment skill. Secondly, the benchmark portfolio reflects those segments of the asset class target covered by the manager.

Staff has worked jointly with the Board's common stock managers and the Board's consultant, Richards & Tierney, to construct appropriate manager benchmarks.

MANAGER ALLOCATION POLICY

In a multiple specialized manager program, an important responsibility of the plan sponsor is to allocate funds among the managers. The policy allocation for a manager is the percentage of the plan's assets assigned to that manager.

A specific policy allocation for each manager is a necessary ingredient in the construction of a completeness fund. Recall that a manager's benchmark defines the particular segments of the asset class target covered by the manager. As a result, the manager's policy allocation determines the plan's coverage within these segments covered by the manager.

The subject of how best to allocate funds among managers is discussed in Part III of the Basic Funds' investment policy paper. For purposes of designing the completeness fund, however, it is assumed that manager policy allocations have been established.

AGGREGATE BENCHMARK PORTFOLIO

A plan sponsor's allocation of funds among its active and passive managers (including a completeness fund) should be consistent with the plan's investment objectives. Within each asset class, achieving this consistency requires that the managers, in aggregate, do not over or underemphasize segments of the asset class target. Measuring the level of segment coverage provided by managers is accomplished by creating an aggregate benchmark portfolio.

An aggregate benchmark portfolio is constructed by adding together all of the managers' benchmarks within an asset class. That is:

$$\begin{array}{c} \text{Aggregate} \\ \text{Benchmark} \\ \text{Portfolio} \end{array} = \begin{array}{c} \text{Mgr. \#1} \\ \text{Benchmark} \\ \text{Portfolio} \end{array} + \begin{array}{c} \text{Mgr. \#2} \\ \text{Benchmark} \\ \text{Portfolio} \end{array} + \ldots + \begin{array}{c} \text{Mgr. \#N} \\ \text{Benchmark} \\ \text{Portfolio} \end{array}$$

In the aggregation process, the benchmarks are weighted by the managers' policy allocations. Because the managers' benchmarks are composed of lists of securities, security weights, and a normal cash positions, the aggregate benchmark portfolio likewise will have the same structure.

COMPLETENESS BENCHMARK PORTFOLIO

Comparing the aggregate benchmark portfolio to the asset class target measures the extent of misfit, or by how much the managers, in aggregate, over or underemphasize segments of the asset class target. Formally, subtracting the aggregate benchmark portfolio from the asset class target produces a completeness benchmark portfolio. That is:

$$\text{Completeness Benchmark Portfolio} = \text{Asset Class Target} - \text{Aggregate Benchmark Portfolio}$$

With respect to the common stock asset class, underemphasized segments appear in the completeness benchmark portfolio as positive holdings of certain stocks. Conversely, overemphasized segments appear as negative positions in other stocks. The positive holdings represent investments that must be added to bring the aggregate benchmark portfolio in line with the asset class target. On the other hand, negative holdings represent investments that must be deleted to reconcile the aggregate benchmark portfolio with the asset class target.

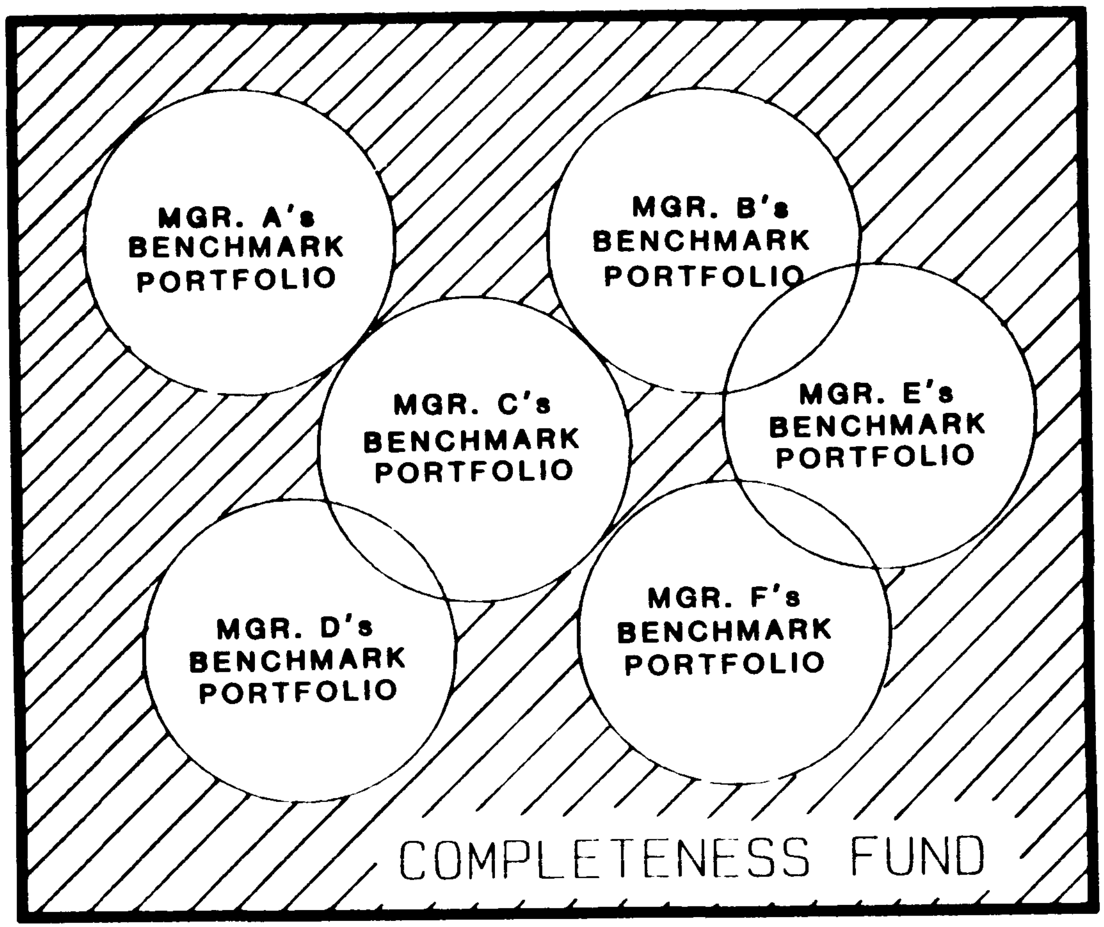
COMPLETENESS FUND

These basic concepts lead to the focus of this paper: the completeness fund. A completeness fund is a portfolio of securities designed to eliminate the misfit between the asset class target and the aggregate benchmark portfolio.

Figure 1 presents a simplified conceptual view of a completeness fund combined with multiple managers. The large rectangle represents the securities (and their associated risk

FIGURE 1

DEPLOYMENT OF COMPLETENESS FUND AND MULTIPLE MANAGERS



ASSET CLASS TARGET

characteristics) that comprise the asset class target. The managers in Figure 1 pursue investment styles that, in aggregate, do not cover the entire asset class target. The completeness fund compensates for this partial coverage by holding securities that are not part of the managers' aggregate investment style (i.e., aggregate benchmark portfolio).

Ideally, the composition of the completeness fund mirrors that of the completeness benchmark portfolio. However, holding all of the positions specified by the completeness benchmark portfolio generally is not practical. In particular, the negative holdings of the completeness benchmark portfolio require stocks to be sold "short," a strategy most institutional investors do not pursue.

In constructing a completeness fund, the objective is to match the performance of the completeness benchmark portfolio as closely as possible, while avoiding the impractical holdings of the benchmark. This objective can be accomplished through various portfolio construction techniques employed by passive managers, such as optimization or stratified sampling. While a discussion of these techniques is beyond the scope of this paper, suffice it to say that they have allowed passive managers to efficiently track the investment performance of various targets.

III. COMPLETENESS FUND CONSTRUCTION

With an understanding of the basic completeness concepts covered in the previous section, the steps involved in constructing a completeness fund are straightforward. Specifically, this construction process involves eight steps.

STEP 1 - ASSET CLASS TARGET SELECTION

The choice of an asset class target is determined. As discussed in Section II, the Board has selected the Wilshire 5000 as the asset class target for the Basic Funds' common stock component.

STEP 2 - ASSET CLASS TARGET SPECIFICATION

The asset class target selected in Step 1 is expressed as an investable list of securities. Ineligible stocks, such as liquor and tobacco stocks in the case of the Basic Funds, are removed. Any other desired modifications of the asset class target securities also take place in this step.

STEP 3 - IDENTIFY THE MANAGERS' BENCHMARKS

Appropriate benchmarks are developed for each manager. Like the asset class target, thses benchmarks are expressed as investable lists of securities, modified to reflect any restrictions under which the managers may operate.

STEP 4 - BUILD THE AGGREGATE BENCHMARK PORTFOLIO

The benchmarks of all managers, both passive and active, are combined to produce an aggregate benchmark portfolio.

STEP 5 - COMPUTE THE COMPLETENESS BENCHMARK

A comparison of the aggregate benchmark portfolio to the asset class target identifies those segments of the asset class where misfit exists. The difference between the aggregate benchmark portfolio and the asset class target, the completeness benchmark portfolio, is expressed as a group of positive and negative holdings in various securities.

STEP 6 - CONSTRUCT THE COMPLETENESS FUND

Given the completeness benchmark portfolio from Step 5, the completeness manager builds a portfolio designed to closely track the performance of this benchmark.

STEP 7 - COMPLETENESS FUND MAINTENANCE

On an on-going basis, minor modifications in the completeness fund's composition are required. These small rebalancings are necessitated primarily by mergers and acquisitions and movements in the market prices of securities in the aggregate benchmark portfolio which, in turn, affect the composition of the completeness benchmark portfolio. Major rebalancings of the completeness fund are needed if managers are added or removed.

STEP 8 - PERFORMANCE EVALUATION

On a periodic basis, the performance of the completeness fund manager is evaluated. The proficiency of the manager in tracking the completeness benchmark portfolio is measured and sources of tracking error are identified.

IV. PERFORMANCE EVALUATION

The success of the completeness fund manager is objectively determined through a performance evaluation process. Evaluating the completeness fund manager requires much the same data collection and analysis techniques as those used to evaluate the Board's active managers. However, while the objective of an active manager is to add value relative to an appropriate benchmark, the goal of the completeness fund manager is to track the performance of the completeness benchmark portfolio within specific tolerances. Thus, the evaluation process reflects these differences in performance expectations.

The completeness fund is expected to track its benchmark closely. However, in any given quarter, the return on the completeness fund may not precisely match that of its benchmark. These quarter-to-quarter deviations in performance are referred to as tracking error.

Tracking error is introduced into the completeness fund management process through three primary sources:

- Differences between the composition of the completeness fund and the completeness benchmark portfolio.
- Costs of trading securities during rebalancings.
- Management fees.

Each of these sources of tracking error is relatively immaterial. Therefore, the tracking error of the completeness fund will be small. Further, it will be largely unbiased. That is, in any given quarter, the tracking error is almost as likely to be positive as negative, producing a self-cancelling effect over time. The completeness fund should experience a tracking error in the range of plus or minus .75 percentage points per year. The completeness fund manager will evaluated by its ability to meet this tracking error target.

In reviewing the completeness fund's performance, an important note of caution should be observed. The completeness fund's returns should not be viewed in isolation from the active managers and the index fund. The completeness fund manager's returns should be compared to those of the completeness benchmark portfolio, and should be judged in the context of improving the results of the entire fund relative to the performance of the asset class target.

The completeness fund holds securities not followed by the active managers. As a result, the completeness fund's performance is likely to vary significantly from that of the other managers and that of asset class target. The completeness fund may at times outperform the active managers and at other times it may underperform them. Regardless, this variance is to be expected. It is part of the process by which the completeness fund offsets the misfit of the combined investment styles of the active managers.

V. THE BASIC RETIREMENT FUNDS' COMMON STOCK MISFIT

MISFIT RISK MEASUREMENT

As previously defined, misfit risk represents the potential for returns on investments in an asset class to deviate from the returns on the asset class target. Misfit risk is present when the aggregate benchmark portfolio differs significantly from the asset class target. How much misfit risk is present in the Basic Funds' common stock component? The answer to this question requires a model of investment risk.

The current state-of-the-art in common stock portfolio risk measurement is a multi-factor risk model. Such a model attributes investment risk to the complex interaction of a number of factors determined to be "common" to security returns.

In the context of a multi-factor risk model, misfit risk is the likely variance (either positive or negative) of returns between the aggregate benchmark portfolio and the asset class target. With respect to the Basic Funds' common stock component, misfit risk is the likely difference between the returns on the Wilshire 5000 and the Basic Funds' common stock investments. This misfit risk results from the managers' benchmarks, in aggregate, being different from the Wilshire 5000.

CURRENT MISFIT

Staff has conducted research into the amount of misfit risk present in the Basic Funds' common stock component. Currently, that misfit risk is approximately 0.9% per annum. That is, in any given year, the Basic Funds' common stock investments are likely to outperform or underperform the Wilshire 5000 by almost 1% due to misfit. (E.g., if the Wilshire 5000 produces a 10% return, the Basic Funds' common stock investments are likely to return 9-11%.)

Staff does not view this current level of misfit as a significant source of concern. The diversity of investment styles among the Board's active common stock, combined with the sizable allocation to the index fund, results in broad coverage of the common stock asset class target.

Nevertheless, the Basic Funds' current common stock misfit is not trivial. Further, if the current group of active common stock managers were altered, the misfit could increase. Therefore, staff believes that the common stock misfit should not be ignored, but rather should be dealt with explicitly through a completeness fund.

Staff believes that a completeness fund offers two primary benefits:

- o Enhances the current Basic Funds' common stock program by improving the potential for the aggregate portfolio to more consistently outperform the Wilshire 5000.
- o Adjusts for changing risk characteristics in the aggregate portfolio due to changes in the manager line-up. This allows the Board to focus on hiring managers on the basis of their ability to add value relative to an appropriate benchmark, and not for the coverage they provide relative to the asset class target.

<u>SOURCES OF MISFIT</u>

An analysis of the current misfit provides a look at the potential sources of misfit risk. The analysis shows that a majority of the misfit risk is caused by the aggregate benchmark portfolio's underemphasis of certain industries relative to the Wilshire 5000.

As shown in Table 1, the largest sources of misfit are the aggregate benchmark portfolio's underweightings in five major industry groups: Oils, Business Machines, Drugs, Telephone and Electric Utilities.

The results of the analysis also isolate the sources of misfit attributable to differences among broadly defined market factors. Relative to the Wilshire 5000, the aggregate benchmark portfolio emphasizes growth stocks and stocks that are more volatile than the overall market. Also, relative to the Wilshire 5000, the aggregate benchmark, on average, contains lower dividend paying stocks and a preponderance of smaller capitalization stocks. The differences in the common factor exposures are also provided in Table 1.

TABLE 1

BASIC RETIREMENT FUND EQUITIES
SUMMARY OF LARGEST MISFIT EXPOSURES
AS OF SEPTEMBER 30, 1987

INDUSTRIES	AGGREGATE BENCHMARK	TARGET	DIFFERENCE
International Oil	2.08%	3.17%	-1.09%
Drugs, Medicine	3.56	4.58	-1.02
Telephone, Telegraph	4.42	5.59	-1.17
Electric Utilities	4.20	5.11	-0.91
Business Machines	6.22	6.78	-0.56

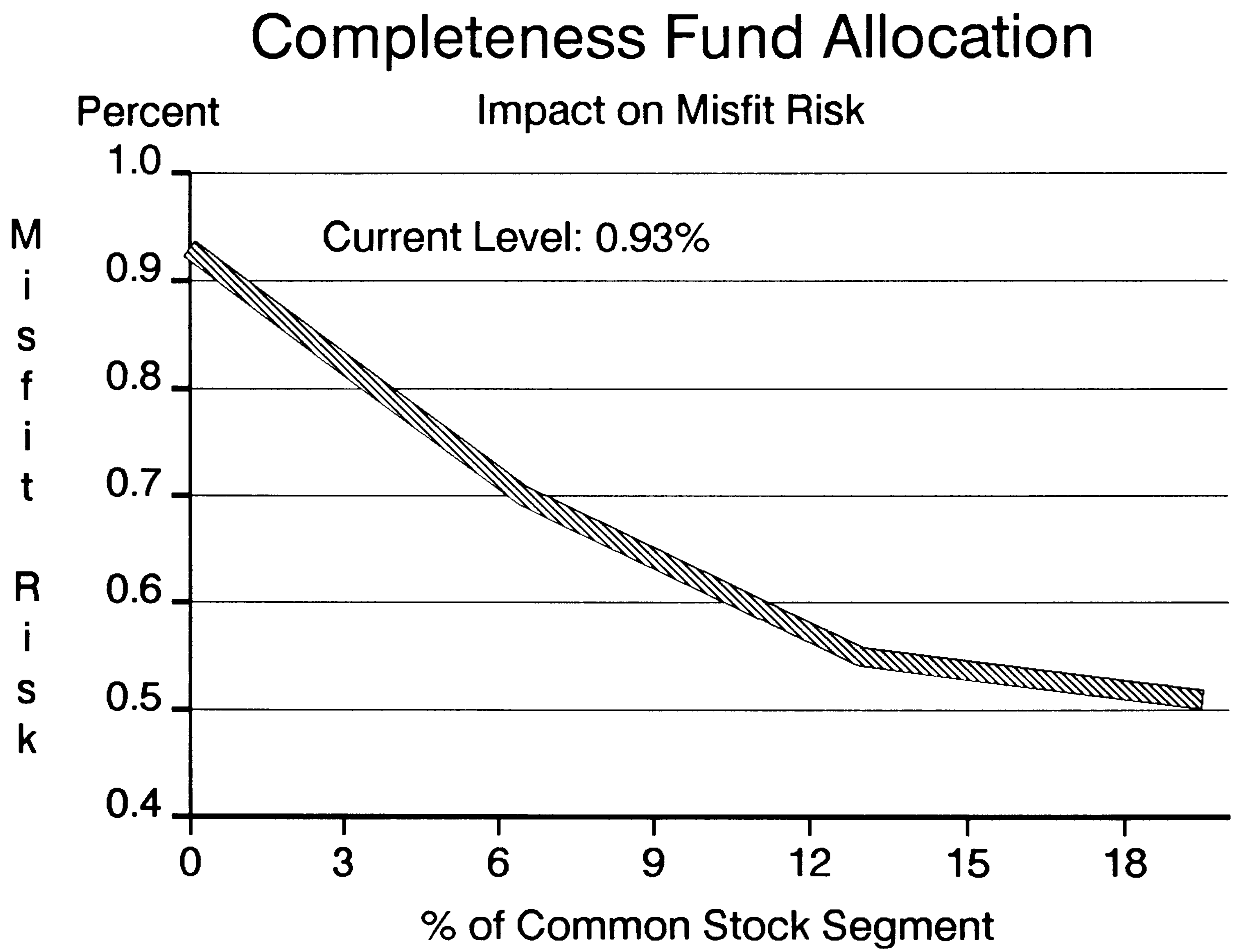
COMMON RISK FACTORS*	AGGREGATE BENCHMARK	TARGET	DIFFERENCE
Growth	0.12	0.05	0.07
Variability in Markets	0.10	0.04	0.06
Size	-0.39	-0.28	-0.11
Yield	-0.13	-0.03	-0.10

* Exposures measured in standard deviation units.

COMPLETENESS ALLOCATION

How much of a pension plan's investment in an asset class should be allocated to a completeness fund? The answer depends on the amount of misfit risk reduction desired. Reduction in misfit risk increases with the size of the completeness fund. Staff's analysis of the Basic Funds' current misfit risk indicates that substantial misfit reduction is possible as the allocation of the common stock component to the completeness fund increases from 0 to 13 percent. This relationship is illustrated in Figure 2. Beyond a 13 percent allocation, very little reduction in misfit risk is possible.

FIGURE 2


Completeness Fund Allocation
Impact on Misfit Risk
Percent
Misfit Risk
Current Level: 0.93%
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
3
6
9
12
15
18
% of Common Stock Segment

VI. RECOMMENDATIONS

Staff recommends that the Board approve the implementation of a common stock completeness fund. The completeness fund will provide the Board with added control and flexibility in the management of risk within the Basic Funds' common stock component. As an adjunct to the active manager program, the completeness fund will permit the managers' investment skills to more consistently benefit the performance of the common stock component.

COMPLETENESS FUND POLICY ALLOCATION

Initially, staff recommends that five percent (5%) of the Basic Funds' common stock component be allocated to the completeness fund. This level of commitment is estimated to reduce misfit from 0.93% to 0.70% per year under the existing manager configuration. This represents a 22% reduction from the current level of misfit. This policy allocation will need to be reviewed each time an active manager is added to or deleted from the Basic Funds' common stock component.

ASSETS COMMITTED TO THE COMPLETENESS FUND

The 5% allocation recommended above represents a completeness fund of approximately $150 million. Staff recommends that the assets now managed for the Basic Funds by the internal manager be re-directed from active management to the completeness fund.

MANAGEMENT OF THE COMPLETENESS FUND

Implementation of a completeness fund can be divided into two distinct sets of responsibilities:

- o Maintain software and databases required to construct the list of completeness fund securities. Because of the highly technical and specialized nature of these services, staff recommends that they be obtained from an outside vendor. At least initially, staff recommends that the Board's consultant provide the necessary technical support.

- o Provide for the daily management of the completeness fund, in particular, the security trading required to maintain the fund. Staff recommends that these responsibilities be assigned to the internal manager.

This division of responsibilities is similar to the procedures now used to maintain the dedicated bond portfolio in the Post Retirement Fund. The software and databases necessary to operate the dedicated bond portfolio are provided by an outside vendor (currently Bankers Trust). Internal staff uses the analysis provided by the vendor to execute the required trades in the portfolio.

With respect to the completeness fund, the outside vendor would have several responsibilities:

- o Construct an aggregate benchmark portfolio for the Board's common stock managers.

- o Compare this aggregate benchmark portfolio to the Basic Funds' common stock asset class target.

- o Provide the internal manager with a list of securities to make up the completeness fund.

- o Repeat the above process periodically so that the internal manager can maintain the completeness fund.

- o Evaluate and monitor the ability of the completeness fund manager to track its benchmark.

This division of repsonsibilities represents the most cost effective and timely approach to managing a completeness fund. The internal staff is fully capable of implementing a passive investment approach and the Board's consultant is able to provide the technical support necessary to construct and rebalance the completeness fund.

COMPLETENESS FUND COST

For the present, the Board's consultant can provide the necessary technical support under its current contract. As a result, the completeness fund can be constructed initially without incurring additional management costs to the Basic Funds.

If the completeness fund is approved, staff will continue to search for these technical support services during the next quarter. Staff intends to provide recommendations to the Board concerning on-going compensation to any vendor at the June 1988 Board meeting.

Tab F

EXECUTIVE DIRECTOR
HOWARD J BICKER

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT
Room 105, MEA Building
55 Sherburne Avenue
St Paul, MN 55155
Tel (612) 296-3328
FAX (612) 296-9572

February 19, 1988

TO: Members, State Board of Investment
Members, Investment Advisory Council

FROM: Fixed Income Committee

SUBJECT: Committee Report

The Fixed Income Committee met during the quarter to review the following items:

ACTION ITEM:

Renewal of BEA Contract

Since April 1, 1987, BEA Associates has managed a $100 million cash enhancement program for the Post Retirement Fund. BEA's contract is due to expire on March 31, 1988. The Committee reviewed the investment objectives established for the BEA program and its performance since the account's inception. The Committee recommends that BEA's contract be extended for another year. The Committee further recommends that the current limits placed on maximum allocations to individual low-risk stock index futures strategies be eliminated. In addition, the Committee recommends that the performance fee structure be revised to incorporate multi-year performance results. This would make the fee structure consistent with that used for the Board's common stock managers. An evaluation of BEA's performance accompanies this report.

INFORMATION ITEMS:

1) Manager Continuation Policy Paper

The committee reviewed staff's Manager Continuation Policy Paper and the proposed Value of Active Management (VAM) quarterly reporting format for the Board's common stock and bond managers. The Committee concurred with the general approach outlined by staff in the position paper. The Committee intends to utilize the Manager Continuation Policy in second quarter 1988 to review to Board's active bond managers.

2) Bond Index Fund

The Committee intends to provide the Board with comprehensive recommendations regarding the total Basic Funds' fixed income program by the Board's June, 1988 meeting. The recommendations will focus on the selection of a bond index fund manager for the Basic Funds fixed income program and the re-allocation of funds from the active managers to the passive bond index manager.

3) External Bond Managers Performance

The Committee reviewed the performance of the Board's external active bond managers. The Committee recommends that no immediate changes be made to the manager group.

Attachment

POST RETIREMENT FUND
BEA ASSOCIATES, INC.
CASH ENHANCEMENT PROGRAM
PERFORMANCE ANALYSIS

I. INVESTMENT APPROACH

On April 1, 1987, BEA Associates was retained to manage a $100 million cash enhancement program utilizing low risk stock index futures investment strategies. The purpose of cash enhancement is to both improve the rate of return earned on cash equivalents in the Post Retirement Fund and to provide the State Board with a practical introduction to the derivatives market. Assets committed to the cash enhancement fund are expected to generate returns 100-200 basis points above the alternative investment vehicle for cash management, represented by the State Street Short Term Investment Fund (STIF).

The cash enhancement strategies utilized by BEA all involve hedged positions, the simultaneous purchase and sale of two different stock index futures and listed options contracts. The purchase/sale combinations are developed to capture a perceived mispricing between the different contracts without incurring any market risk. Although there is no risk to principal, there is the risk that mispricings do not realign as expected and that returns fall short of the STIF alternative.

Mispricing opportunities are not always present and usually last only a period of weeks. Once the mispricings have been corrected by the market, BEA withdraws from the financial futures market. When not committed to the enhancement strategies, assets are managed as short term money market type securities.

II. PERFORMANCE

	QUARTER ENDING			SINCE INCEPTION
	6/30/87	9/30/87	12/31/87	4/1/87
Portfolio Value ($ Millions)	$101.37	$103.53	$105.87	
Total Portfolio Return	1.37%	2.13%	2.26%	5.87%
Benchmark (STIF) Return	1.60	1.65	1.77	5.10
Contribution to Return				
Enhanced Cash Strategies				
Hedged Puts	.00%	.26%	.36%	.63%
Inter-Market Spread	---	---	.08	.08
Cash Management	1.37	1.87	1.83	5.16
	4.37%	2.13%	2.26%	5.87%

III. ANALYSIS

For the nine months ending December 31, the return on the BEA cash enhancement fund was 5.87% compared to the State Street Short Term Investment Fund (STIF) return of 5.10%. By using various cash management strategies, BEA realized a base return of 5.16%. The additional return provided by active strategies was .71%, reflecting a disappointing initial quarter. During the third and early in the fourth quarter, short term rates rose sufficiently to reduce potential active strategy opportunities. However, the rate drop in late October plus the increased volatility of the market provided new opportunities for increased active management.

IV. RECOMMENDATION

Staff recommends that the contract with BEA be renewed for one year. In addition, staff recommends that the 40% limit on the hedged put strategy be eliminated. Staff also recommends that the performance fee structure be revised to incorporate multi-year performance results. This would be similar to the structure used for the Board's common stock managers.

Tab G

STATE OF MINNESOTA
STATE BOARD OF INVESTMENT
Room 105, MEA Building
55 Sherburne Avenue
St Paul, MN 55155
Tel (612) 296-3328
FAX (612) 296-9572

February 19, 1988

TO: Members, State Board of Investment
Members, Investment Advisory Council

FROM: Alternative Investment Committee

SUBJECT: Committee Report

The Alternative Investment Committee met during the quarter to review the following items:

INFORMATION ITEMS:

1) Strategy Review

To increase overall portfolio diversification, 15% of the Basic Retirement Funds is allocated to alternative investments. Alternative investments include real estate, venture capital and resource investments where Minnesota State Board of Investment (SBI) participation is limited to commingled funds or other pooled vehicles. A chart summarizing the Board's current commitments is attached.

The venture capital investment strategy is to establish and maintain a broadly diversified venture capital portfolio comprised of investments that provide diversification by industry type, stage of corporate development and location. To date, the SBI has committed to twelve commingled venture capital funds for a total commitment of $273.1 million.

The real estate investment strategy involves three steps. The first step calls for investment of 30-40% of the real estate portfolio in diversified open-end commingled funds. The second step calls for investment of 30-40% of the real estate portfolio in diversified closed-end commingled funds. The third step calls for investment of 20-30% of the real estate portfolio in less diversified, more focused (specialty) commingled funds. Currently, the SBI has committed $385 million to twelve commingled real estate funds.

The strategy for resource investment requires that investments be made in resource investment vehicles that are specifically designed for institutional investors to provide an inflation hedge and additional diversification. Individual resource investments will include proved producing oil and gas properties, royalties and other investments that are diversified geographically and by type. Currently, the SBI has committed $90.0 million to five commingled oil and gas funds.

2) Annual Review Sessions

During the latest quarter, the Alternative Investment Committee conducted annual review sessions with three of the SBI's venture capital managers (Norwest, Summit and First Century) and the SBI's two resource managers (First Reserve and Apache). An annual review summary for each manager is attached.

The venture capital managers are in approximately the third year of their investment cycle. Norwest and Summit are nearing full investment and are actively working with portfolio companies to improve operations and increase the value of the investments. First Century has had a much slower investment pace that is expected to accelerate significantly in the next two years.

The resource managers reviewed by the Committee feel that further significant declines in oil and gas prices are unlikely and the investment environment during the last year has improved. Current expectations are that the Apache III investment, made in December 1986, will meet or exceed original long term return expectations. The SBI's other oil and gas investments were made at higher oil and gas price levels and will likely experience lower than originally expected long term returns.

3) Future Considerations

Going forward, the Alternative Investment Committee agenda will include:

- o Reviewing investment objectives, strategy, asset allocation and performance measurement
- o Considering potential alternative investment consultants
- o Considering additional investments with new and existing managers

- o Conducting annual review sessions with existing alternative investment managers

ACTION ITEMS:

The Alternative Investment Committee considered three additional investments in venture capital and resource funds during the quarter. Specifically, the Committee recommends the Board approve the following commitments subject to final negotiations and review by the Attorney General:

1) ADDITIONAL INVESTMENTS WITH EXISTING MANAGERS:

- o $35 million investment in Summit Ventures II

Summit Ventures II is a follow-on fund to the first fund offered by Summit Ventures in 1984. Summit's strategy is to find and create investment opportunities principally in profitable young technology, health care, and environmental services companies, often before the companies are seeking capital. Currently, the SBI has a $10 million investment in Summit Ventures I.

- o $15 million investment in First Reserve Secured Energy Assets Fund

The First Reserve Secured Energy Assets Fund is a new fund being offered by First Reserve. The primary strategy of the fund is to make secured loans to energy companies. The loans will yield current returns comparing favorably with institutional grade debt securities and which incorporate significant appreciation components (royalties, equity, etc.) that offer the prospect of substantially higher total return. Currently, the SBI has $22 million invested with First Reserve.

2) INVESTMENT WITH A NEW MANAGER:

- o $5 million investment in First Chicago Venture Partnership Acquisition Fund

First Chicago Venture Partnership Acquisition fund is the first fund of its kind offered by First Chicago. This fund will invest in the growing secondary market for venture capital limited partnership interests. First Chicago is one of the largest and most experienced venture partnership consulting and management groups in the country. A summary description of the proposed First Chicago Venture Partnership Acquisition fund is attached.

Attachments

ALTERNATIVE EQUITY INVESTMENTS
FOURTH QUARTER 1987

REAL ESTATE:	INCEPT DATE	FUND SIZE (MILLIONS)	SBI COMMITMENT	SBI-FUNDED	SBI- TO BE FUNDED	FUND DESCRIPTION
EQUITABLE	10/81	$2,850	$40,000,000	$40,000,000	$0	OPEN END - DIVERSIFIED
AETNA	4/82	$1,592	$40,000,000	$40,000,000	$0	OPEN END - DIVERSIFIED
PRUDENTIAL	9/81	$4,584	$40,000,000	$40,000,000	$0	OPEN END - DIVERSIFIED
RREEF- USA III	4/84	$773	$75,000,000	$71,300,000	$3,700,000	CLOSED END - DIVERSIFIED
HEITMAN I	6/84	$113	$20,000,000	$20,000,000	$0	CLOSED END - DIVERSIFIED
HEITMAN II	10/85	$238	$30,000,000	$30,000,000	$0	CLOSED END - DIVERSIFIED
HEITMAN III	11/86	$200	$20,000,000	$15,000,000	$5,000,000	CLOSED END - DIVERSIFIED
TCW I	7/85	$216	$40,000,000	$40,000,000	$0	CLOSED END - SPECIALIZED
TCW II	9/86	$250	$30,000,000	$24,000,000	$6,000,000	CLOSED END - SPECIALIZED
STATE STREET I	7/85	$103	$20,000,000	$20,000,000	$0	CLOSED END - SPECIALIZED
STATE STREET II	7/86	$86	$15,000,000	$15,000,000	$0	CLOSED END - SPECIALIZED
STATE STREET III	11/87	$82	$15,000,000	$3,333,333	$11,666,667	CLOSED END - SPECIALIZED
TOTAL R.E. PORTFOLIO			$385,000,000	$358,633,333	$26,366,667	
VENTURE CAPITAL:						
NORWEST	1/84	$60	$10,000,000	$10,000,000	$0	EARLY STAGE
KKR I	3/84	$1,000	$25,000,000	$25,000,000	$0	LBO
KKR II	12/85	$2,000	$18,365,172	$18,365,172	$0	LBO
KKR III	10/87	$4,300	$146,634,660	$31,263,167	$115,371,493	LBO
SUMMIT	12/84	$93	$10,000,000	$7,500,000	$2,500,000	LATER STAGE
FIRST CENTURY	12/84	$100	$10,000,000	$2,500,000	$7,500,000	EARLY STAGE
DSV	4/85	$60	$10,000,000	$10,000,000	$0	EARLY STAGE
MATRIX	7/85	$70	$10,000,000	$7,500,000	$2,500,000	EARLY STAGE
INMAN/BOWMAN	6/85	$44	$7,500,000	$3,750,000	$3,750,000	EARLY STAGE
ALLIED	7/85	$40	$5,000,000	$3,333,334	$1,666,666	LATER STAGE
SUPERIOR VENTURE	6/86	$35	$6,600,000	$1,661,250	$4,938,750	EARLY STAGE - MN.
GOLDER THOMA	10/87	$225	$14,000,000	$700,000	$13,300,000	LATER STAGE
TOTAL V.C. PORTFOLIO			$273,099,832	$121,572,923	$151,526,909	
RESOURCES:						
AMGO I	7/81	$144	$15,000,000	$15,000,000	$0	DEBT WITH EQUITY
AMGO II	2/83	$36	$7,000,000	$7,000,000	$0	DEBT WITH EQUITY
APACHE I	5/84	$100	$15,000,000	$879,908	$14,120,092	DEBT WITH EQUITY
APACHE II	10/85	$180	$23,000,000	$22,170,466	$829,534	DEBT WITH EQUITY
APACHE III	12/86	$190	$30,000,000	$30,000,000	$0	NET PROFITS INTEREST
TOTAL RES. PORTFOLIO:			$90,000,000	$75,050,374	$14,949,626	
TOTAL ALT. INV. PORT.			$748,099,832	$555,256,630	$192,843,202	

ALTERNATIVE INVESTMENT MANAGER INFORMATION
ANNUAL REVIEW SUMMARY
January 21, 1988

FUND NAME:	Norwest Venture Partners
FIRM NAME:	Norwest Venture Capital Management
CONTACT:	John Whaley, Doug Johnson
ACCOUNT INCEPTION:	January, 1984
TOTAL FUND COMMITMENTS:	$60,000,000
SBI TOTAL COMMITMENT:	$10,000,000
SBI CURRENT INVESTMENT (COST):	$10,000,000
SBI CURRENT INVESTMENT (MARKET VALUE):	$ 8,781,175
SBI DISTRIBUTIONS RECEIVED:	$ 1,993,995

INVESTMENT DESCRIPTION: Norwest Venture Capital Management, a wholly owned subsidiary of Norwest Corp., is the general partner and manager of the partnership. Norwest Venture Capital also manages the Norwest Growth Fund, an SBIC, and Norwest Equity capital, a leveraged buyout fund. Norwest Venture Partners' investment focus is on high technology companies in the early stages of corporate development. However, the partnership's portfolio also includes investments in expansion stage firms and is diversified by the location and industry type of its portfolio companies. Norwest Venture Management has offices in Minneapolis, Phoenix, and Portland, Oregon. Northwest Venture Partners I was formed in January 1984 and has a term of ten years.

PORTFOLIO COMPOSITION

# OF PORTFOLIO COMPANIES	MARKET VALUE PORTFOLIO COMPANIES
32	$29,721,600

LOCATION	
East:	14.2%
Midwest	23.8
South:	0.0
West:	62.0

STATE OF DEVELOPMENT	
Early Stage	66.5%
Expansion Stage	33.5
Mezzanine Stage	0.0
Leverage Buyouts	0.0

INDUSTRY:	
Computer-related	57.5%
Medical/Healthcare	8.3
Consumer-related	6.6
Communications	1.0
Industrial/Machinery	14.2
Other	12.4

IX. DIVERSIFICATION

No single investment will represent more than ten percent of the fund. The investments will be highly diversified geographically, by stage and by industry.

VENTURE CAPITAL MANAGER PROFILE

I. BACKGROUND DATA

FUND MANAGER:	First Chicago Investment Advisors
TYPE OF FUND:	Purchase of Secondary Venture Capital Limited Partnership Interests
TOTAL FUND SIZE:	$50 Million
INTERVIEW DATE:	2/18/88
MANAGER CONTACT:	Bonn French
ADDRESS:	Three First National Plaza, 9th Floor Chicago, Illinois 60670-0140
TELEPHONE:	312-732-6743

II. ORGANIZATION AND STAFF

First Chicago Investment Advisors has nine professionals dedicated to direct and partnership investment activities. Bonn French (Vice President) and Marianne Woodward (Associate) will have primary responsibility for the fund. Other staff members will be on-call to assist, as needed.

First Chicago has been making venture capital investments, primarily for institutional clients, since 1972. Current assets under management exceed $465 million in over 60 venture capital partnerships and over 40 direct deals.

III. INVESTMENT STRATEGY

The Venture Partnership Acquisition Fund (VPAF) will invest exclusively in secondary venture capital limited partnership interests with the objective of earning rates of return superior to that of traditional venture capital investing. Secondary interests are presented by limited partners, who for a variety of reasons, have decided to liquidate their venture holdings. These sales offer an opportunity to invest at cost or below in partnerships that are two to five years old, greatly increasing the potential rate of return on investment.

Typically, the rate of return on investments in secondary interests is enhanced due to the compressed time to liquidity. Risk can also be reduced since the underlying portfolio companies can be assessed for potential winners and losers. Another feature of the secondary interests is that, unlike the original investments, price can be negotiated. This price is frequently at a discount from cost, as this market is highly illiquid and inefficient.

The fund will focus on two to five year old partnerships that have made substantial investments, but have yet to realize meaningful liquidity or significant write-ups. Most of the dollars in the industry today fall into this category, given the large increases in commitments to partnerships that began in the early 1980's.

While attractive purchases may be sporadic in terms of timing and amount, it is likely that $50 million could easily be invested within a three year time frame. First Chicago estimates the size of the market to be $100 million annually and growing very rapidly.

Regarding the pricing strategy for purchasing these interests, it is First Chicago's intent to buy at a discount from market value. The discount will vary depending on the age and upside potential of the underlying portfolio companies.

IV. DRAWDOWN SCHEDULE

10% initially and increments of 10% to be drawn down on 30 days notice with all drawdowns to be within the first three years. Commitments not drawn after the third year would be released.

V. TERM

Ten years with provisions for annual extensions if approved by 60% of the participants.

VI. FEE

One percent of net asset value based on the money drawndown by First Chicago Investment Advisors (FCIA).

VII. DISTRIBUTIONS

Only cash would be returned to the participants. FCIA will manage the distributions of stocks to the VPAF and will flow-through cash to the participants.

VIII. REINVESTMENT

This is intended to be a single cycle fund. No distributions will be reinvested in new secondary interests.

ALTERNATIVE INVESTMENT MANAGER INFORMATION
ANNUAL REVIEW SUMMARY
January 21, 1988 Meeting

FUND NAME:	First Century Partnership III
FIRM NAME:	Smith Barney
CONTACT:	Jack Dulaney, Michael Myers
ACCOUNT INCEPTION:	December, 1984
TOTAL FUND COMMITMENTS:	$100,000,000
SBI TOTAL COMMITMENT:	$10,000,000
SBI CURRENT INVESTMENT (COST):	$2,500,000
SBI CURRENT INVESTMENT (MARKET VALUE):	$2,693,124
SBI DISTRIBUTIONS RECEIVED:	$43,075

INVESTMENT DESCRIPTION: First Century III was formed in December 1984 and has a term of ten years. The general partner and manager of the partnership is Smith Barney Venture Corp., a subsidiary of Smith Barney Harris Upham and Co. Smith Barney Venture has offices in New York and San Francisco. This is the third fund formed by the firm since 1972. The partnership invests primarily in early stage, high technology companies. Investments are diverisfied by location and industry group.

PORTFOLIO COMPOSITION

# OF PORTFOLIO COMPANIES	MARKET VALUE PORTFOLIO COMPANIES
11	$14,851,126

LOCATION	
East:	32%
Midwest	0
South:	40
West:	28

STATE OF DEVELOPMENT	
Early Stage	100%
Expansion Stage	0
Mezzanine Stage	0
Leverage Buyouts	0

INDUSTRY:

Computer-software	10%
Medical/Healthcare	23
Consumer-related	12
Electronic/Instrumentation	9
Electronic/Semiconductor	17
Electronic/Publishing	4
Electronic/Factory Automation	[illegible]

ALTERNATIVE INVESTMENT MANAGER INFORMATION
ANNUAL REVIEW SUMMARY
January 21, 1988

FUND NAME:	Summit Ventures
FIRM NAME:	Stamps, Woodsum & Co.
CONTACT:	Roe Stamps, Steve Woodsum
ACCOUNT INCEPTION:	December, 1984
TOTAL FUND COMMITMENTS:	$93,000,000
SBI TOTAL COMMITMENT:	$10,000,000
SBI CURRENT INVESTMENT (COST)	$ 7,500,000
SBI CURRENT INVESTMENT (MARKET VALUE)	$ 7,747,320
SBI DISTRIBUTIONS RECEIVED:	$ 1,233,125

INVESTMENT DESCRIPTION: Summit Ventures was formed in December 1984 by Stamps, Woodsum & Co., the managing general partners of the fund and Shearson/American Express. Stamps and Woodsum focus on profitable, expansion stage firms that have not yet received any venture backing. The majority of the partnership's investments are in high tech firms. Investments are diversified by location and industry type. Stamps, Woodsum operates out of offices in Boston, Atlanta, and Southern California. Summit Ventures has a ten year term.

PORTFOLIO COMPOSITION

# OF PORTFOLIO COMPANIES	MARKET VALUE PORTFOLIO COMPANIES
34	$48,023,770

LOCATION	
East:	32%
Midwest:	13
South:	9
West:	46

STATE OF DEVELOPMENT	
Early Stage	14%
Expansion Stage	78
Mezzanine Stage	0
Leverage Buyouts	8

INDUSTRY:

Computer-related	52%
Medical/Healthcare/Environmental	31
Consumer-related	3
Communications	10

ALTERNATIVE INVESTMENT MANAGER INFORMATION
ANNUAL REVIEW SUMMARY
January 21, 1988

FUND NAME:	Apache Equipment Loan Apache 1985 Acquistion - Notes Apache 1986 Acquisition - Net Profits Interest	
FIRM NAME:	Apache Corporation	
CONTACT:	Charlie Hann, John Kocur, Dave Higgins	
ACCOUNT INCEPTION:	Apache Equipment Loan	May, 1984
	Apache 1985 - Notes	October, 1985
	Apache 1986 - NPI	December, 1986
TOTAL FUND COMMITMENTS:	Apache Equipment Loan	$100,000,000
	Apache 1985 - Notes	$118,000,000
	Apache 1986 - NPI	$190,000,000
SBI TOTAL COMMITMENT:	Apache Equipment Loan	$ 15,000,000
	Apache 1985 - Notes	$ 23,000,000
	Apache 1986 - NPI	$ 30,000,000
SBI CURRENT INVESTMENT (COST):	Apache Equipment Loan	$ 879,908
	Apache 1985 - Notes	$ 22,830,922
	Apache 1986 - NPI	$ 29,899,644
SBI CURRENT INVESTMENT (MARKET VALUE):	Apache Equipment Loan	$ 879,908
	Apache 1985 - Notes	$ 22,170,466
	Apache 1986 - NPI	$ 29,899,644
SBI DISTRIBUTIONS RECEIVED:	Apache Equipment Loan	$ 328,581
	Apache 1985 - Notes	$ 5,134,271
	Apache 1986 - NPI	$ 6,164,146

INVESTMENT DESCRIPTION:

- Apache Equipment Loan

The Apache Corp. 10% Equipment Financing Notes are a $100 million private placement to finance Apache's portion of production facility expenditures. The expenditures were made under the terms of a series of offshore joint ventures in the Gulf of Mexico. The joint ventures were organized by Shell Oil Company. In addition to fixed interest payments of 10% per annum, noteholders will receive additional interest of 2% of Apache's share of gross revenues from the joint ventures. Principal and interest on the notes are estimated to be repaid by 1992. The 2% additional interest will be paid to noteholders throughout the life of producing properties. Apache Corp. has offices in Minneapolis and Denver.

- Apache 1985 Acquisition - Notes

The Apache 1985 Properties Acquisition Notes are a $118 million private placement to finance the acquisition and tangible development costs related to certain producing oil and gas properties, of which some are fully developed and some are partially developed. In addition to fixed interest payments of 10% per annum, noteholders will receive additional interest of 2% of Apache's share of gross revenues from the properties. Principal and interest on the notes are estimated to be repaid by 1996. The 2% additional interest will be paid to noteholders throughout the life of producing properties.

- Apache 1986 Acquisition - Net Profits Interest

The Apache 1986 Acquisition Net Profits Interest is a $190 million private placement to acquire a non-operating interest in the net profit generated by oil and gas properties acquired in 1986 from Occidental Petroleum Company. Investors will receive a 85% net profits interest in the financed share of producing properties until the cumulative total of such payments equals the investment cost plus 8% per year return on investment (the "Payout"). However, if the cumulative net profit discounted at 10% should fail to exceed a defined cumulative cash flow comparably discounted, investors will receive a 90% net profits interest until Payout. After Payout, investors will receive a 75% net profits interest for the life of the producing properties. Payout is expected in 1991.

GEOGRAPHIC PROPERTY DISTRIBUTION

	APACHE EQUIPMENT LOAN	APACHE 1985 ACQUISITION	APACHE 1986 ACQUISITION
Louisiana	50%	26%	26%
Oklahoma		13	44
Texas	50	18	11
Wyoming		36	5
Other		7	14

ALTERNATIVE INVESTMENT MANAGER INFORMATION
ANNUAL REVIEW SUMMARY
January 21, 1988 Meeting

FUND NAME:	AMGO I-II	
FIRM NAME:	First Reserve	
CONTACT:	John Hill	
ACCOUNT INCEPTION:	AMGO I	July 1981
	AMGO II	February 1983
TOTAL FUND COMMITMENTS:	AMGO I	$144,000,000
	AMGO II	$ 36,000,000
SBI TOTAL COMMITMENT:	AMGO I	$ 15,000,000
	AMGO II	$ 7,000,000
SBI CURRENT INVESTMENT (COST):	AMGO I	$ 15,000,000
	AMGO II	$ 7,000,000
SBI CURRENT INVESTMENT (MARKET VALUE):	AMGO I	$ 4,969,587
	AMGO II	$ 6,472,000
SBI DISTRIBUTIONS (RECEIVED):	AMGO I	$ 2,818,070
	AMGO II	$ 1,315,300

INVESTMENT DESCRIPTION:

- AMGO I:

  AMGO I was formed in July, 1981 and has a term of twenty years. The general partner and manager of the fund is First Reserve Corp. The general partner's long-term investment strategy is to create a diversified portfolio of oil and gas investments for the fund. The portfolio is diversified across four dimensions: location, geological structure, investment type, and operating company.

- AMGO II:

  Formed in December, 1982, AMGO II has a nineteen year term. First Reserve Corp. of New York is the general partner and manager of both AMGO I and AMGO II. First reserve's strategy for AMGO II is similar to that of AMGO I. The portfolio is diversified across the same four dimensions as AMGO I.

AMGO I PORTFOLIO COMPOSITION

# OF PORTFOLIO COMPANIES	MARKET VALUE PORTFOLIO COMPANIES
18	$47,700,000

GEOLOGICAL AREA		TYPE OF INVESTMENT	
Louisiana	17.4%	Royalty	19.9%
Oklahoma	20.7	Acreage	7.2
Oklahoma/Texas	1.8	Drilling	11.4
Rocky Mountains	12.4	Equity	7.4
Gulf Coast	5.7	Production	19.9
Texas	18.0	Surface Facilities	2.7
Mississippi	8.8	Conv. Notes and Preferred	31.0
West Virginia	0.9	Other	0.6
California	7.8		
Miscellaneous	6.5		

AMGO II PORTFOLIO COMPOSITION

# OF PORTFOLIO COMPANIES	MARKET VALUE PORTFOLIO COMPANIES
10	$33,300,000

GEOLOGICAL AREA		TYPE OF INVESTMENT	
Louisiana	9.9%	Royalty	6.1%
Oklahoma	11.9	Acreage	0.0
Oklahoma/Texas	8.8	Drilling	0.0
Rocky Mountains	6.1	Equity	16.5
Gulf Coast	16.5	Production	8.8
Texas	16.5	Surface Facilities	13.1
Mississippi	2.2	Conv. Notes and Preferred	55.5
West Virginia	1.9		
Miscellaneous	26.0		