Northern Trust Corporation

Custody and Fund Services

System and Organization Controls (SOC 1SM) Report

For the Twelve Months Ended March 31, 2018
PREFACE
(Not Covered by Independent Service Auditor’s Report)
May 10, 2018

Dear Client:

With Northern Trust, all of our clients benefit from our commitment to providing quality service, fresh perspectives, and innovative solutions. You can rely on us to uphold our principles of service, expertise, and integrity, freeing you to focus on your strategic priorities.

Consistent with this commitment, we prepared an in-depth report on the internal controls applicable to processing your custody and fund services transactions. We engage our independent service auditor, KPMG LLP, to perform an examination of our Custody and Fund Services system in accordance with the American Institute of Certified Public Accountants (AICPA) Statement on Standards for Attestation Engagements No. 18 (SSAE 18), Clarification and Recodification (of Standards for Attestation Engagements including No 16, Reporting on Controls at a Service Organization) and in accordance with International Standard on Assurance Engagements 3402 (ISAE 3402), Assurance Reports on Controls at a Service Organization, issued by the International Auditing and Assurance Standards Board.

The accompanying March 31, 2018 Custody and Fund Services SOC 1 Report covers the twelve-month period from April 1, 2017 to March 31, 2018. The accompanying report is designed in accordance with standards published by the AICPA and is organized in five sections:

- Independent Service Auditor's Report
- Management's Assertion on its Description of the Custody and Fund Services System
- Northern Trust Corporation's Description of its Custody and Fund Services System
- Northern Trust Corporation's Control Objectives and Related Controls and Independent Service Auditor's Tests of Controls and Results of Tests
- Additional Information Provided by Northern Trust Corporation

We also draw your attention to the Complementary User Entity Controls described in Section III of the accompanying report, which highlight the internal control responsibilities that Northern Trust believes each client should have in place for their accounts. We expect that you will evaluate the Complementary User Entity Controls as you review and rely upon this report.

We value our relationship with you and recognize our responsibility to provide effective internal controls over financial reporting and the importance of aligning our investments in systems, operations, and service enhancements with your evolving needs. We appreciate the confidence you place in Northern Trust.

Sincerely,

[Signature]
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I. INDEPENDENT SERVICE AUDITOR’S REPORT
Independent Service Auditor’s Report

The Members of the Audit Committee
Northern Trust Corporation:

Scope

We have examined Northern Trust Corporation’s description of its system entitled “Northern Trust Corporation’s Description of its Custody and Fund Services System” for processing user entities’ transactions throughout the period April 1, 2017 to March 31, 2018 (the description) and the suitability of the design and operating effectiveness of the controls included in the description to achieve the related control objectives stated in the description, based on the criteria identified in “Northern Trust Corporation’s Assertion” (the assertion). The controls and control objectives included in the description are those that management of Northern Trust Corporation believes are likely to be relevant to user entities’ internal control over financial reporting, and the description does not include those aspects of the Custody and Funds Services system that are not likely to be relevant to user entities’ internal control over financial reporting.

The information included in Section V, “Additional Information Provided by Northern Trust Corporation,” is presented by management of Northern Trust Corporation to provide additional information and is not a part of Northern Trust Corporation’s description of its system made available to user entities during the period April 1, 2017 to March 31, 2018. Information about Northern Trust Corporation’s approach to business continuity and disaster recovery has not been subjected to the procedures applied in the examination of the description of the Custody and Funds Services system and of the suitability of the design and operating effectiveness of controls to achieve the related control objectives stated in the description of the Custody and Funds Services system, and accordingly, we express no opinion upon it.

Northern Trust Corporation uses the subservice organizations identified in Section III to perform some of the services provided to user entities that are likely to be relevant to those user entities’ internal control over financial reporting. The description includes only the control objectives and related controls of Northern Trust Corporation and excludes the control objectives and related controls of the subservice organizations. The description also indicates that certain control objectives specified by Northern Trust Corporation can be achieved only if complementary subservice organization controls assumed in the design of Northern Trust Corporation’s controls are suitably designed and operating effectively, along with the related controls at Northern Trust Corporation. Our examination did not extend to controls of the subservice organizations, and we have not evaluated the suitability of the design or operating effectiveness of such complementary subservice organization controls.

The description indicates that certain control objectives specified in the description can be achieved only if complementary user entity controls assumed in the design of Northern Trust Corporation’s controls are suitably designed and operating effectively, along with related controls at Northern Trust Corporation. Our examination did not extend to such complementary user entity controls, and we have not evaluated the suitability of the design or operating effectiveness of such complementary user entity controls.

Service Organization’s Responsibilities

In Section II, Northern Trust Corporation has provided an assertion about the fairness of the presentation of the description and suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description. Northern Trust Corporation is responsible for preparing the description and its assertion, including the completeness, accuracy, and method of presentation of the description and assertion, providing the services covered by the description, specifying the control objectives and stating them in the description, identifying the risks that threaten the achievement of the control objectives, selecting the criteria stated in the assertion, and designing, implementing, and documenting controls that are suitably designed and operating effectively to achieve the related control objectives stated in the description.
Service Auditor's Responsibilities

Our responsibility is to express an opinion on the fairness of the presentation of the description and on the suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description, based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accounts and International Standard on Assurance Engagements (ISAE) 3402 established by the International Auditing and Assurance Standards Board. Those standards require that we plan and perform the examination to obtain reasonable assurance about whether, in all material respects, based on the criteria in management's assertion, the description is fairly presented and the controls were suitably designed and operating effectively to achieve the related control objectives stated in the description throughout the period April 1, 2017 to March 31, 2018. We believe that the evidence we obtained is sufficient and appropriate to provide a reasonable basis for our opinion.

An examination of a description of a service organization's system and the suitability of the design and operating effectiveness of controls involves:

- performing procedures to obtain evidence about the fairness of the presentation of the description and the suitability of the design and operating effectiveness of the controls to achieve the related control objectives stated in the description, based on the criteria in management's assertion,

- assessing the risks that the description is not fairly presented and that the controls were not suitably designed or operating effectively to achieve the related control objectives stated in the description,

- testing the operating effectiveness of those controls that management considers necessary to provide reasonable assurance that the related control objectives stated in the description were achieved,

- evaluating the overall presentation of the description, suitability of the control objectives stated in the description, and suitability of the criteria specified by the service organization in its assertion.

Service Auditor's Independence and Quality Control

We have complied with the independence and other ethical requirements of the Code of Professional Conduct established by the AICPA. We have also applied the statements on quality control standards established by the AICPA and, accordingly, maintain a comprehensive system of quality control.

Inherent Limitations

The description is prepared to meet the common needs of a broad range of user entities and their auditors who audit and report on user entities' financial statements and may not, therefore, include every aspect of the system that each individual user entity may consider important in its own particular environment. Because of their nature, controls at a service organization may not prevent, or detect and correct, all misstatements in processing or reporting transactions. Also, the projection to the future of any evaluation of the fairness of the presentation of the description, or conclusions about the suitability of the design or operating effectiveness of the controls to achieve the related control objectives, stated in the description is subject to the risk that controls at a service organization may become ineffective.

Description of Tests of Controls

The specific controls tested and the nature, timing, and results of those tests are listed in Section IV.
Opinion

In our opinion, in all material respects, based on the criteria described in Northern Trust Corporation's assertion:

a. the description fairly presents the Custody and Fund Services system that was designed and implemented throughout the period April 1, 2017 to March 31, 2018;

b. the controls related to the control objectives stated in the description were suitably designed to provide reasonable assurance that the control objectives would be achieved if the controls operated effectively throughout the period April 1, 2017 to March 31, 2018 and subservice organizations and user entities applied the complementary controls assumed in the design of Northern Trust Corporation's controls throughout the period April 1, 2017 to March 31, 2018; and

c. the controls operated effectively to provide reasonable assurance that the control objectives stated in the description were achieved throughout the period April 1, 2017 to March 31, 2018 if complementary subservice organization and user entity controls, assumed in the design of Northern Trust Corporation's controls, operated effectively throughout the period April 1, 2017 to March 31, 2018.

Restricted Use

This report, including the description of tests of controls and results thereof in Section IV, is intended solely for the information and use of management of Northern Trust Corporation, user entities of Northern Trust Corporation's Custody and Fund Services system during some or all of the period April 1, 2017 to March 31, 2018, and their auditors who audit and report on such user entities' financial statements or internal control over financial reporting and have a sufficient understanding to consider it, along with other information, including information about controls implemented by user entities themselves, when assessing the risks of material misstatement of user entities' financial statements. This report is not intended to be and should not be used by anyone other than these specified parties.

May 10, 2018
Chicago, Illinois
II. MANAGEMENT'S ASSERTION ON ITS DESCRIPTION OF THE CUSTODY AND FUND SERVICES SYSTEM
May 10, 2018

We have prepared the description of Northern Trust Corporation's Custody and Funds Services system entitled, "Northern Trust Corporation's Description of Its Custody and Funds Services System," for processing user entities' transactions throughout the period April 1, 2017 to March 31, 2018 (description) for user entities of the system during some or all of the period April 1, 2017 to March 31, 2018, and their auditors who audit and report on such user entities' financial statements or internal control over financial reporting and have a sufficient understanding to consider it, along with other information, including information about controls implemented by subservice organizations and user entities of the system themselves, when assessing the risks of material misstatement of user entities' financial statements.

Northern Trust Corporation uses the subservice organizations identified in Section III to perform some of the services provided to user entities that are likely to be relevant to those user entities' internal control over financial reporting. The description includes only the control objectives and related controls of Northern Trust Corporation and excludes the control objectives and related controls of the subservice organizations. The description also indicates that certain control objectives specified in the description can be achieved only if complementary subservice organization controls assumed in the design of our controls are suitably designed and operating effectively along with the related controls at Northern Trust Corporation. The description does not extend to controls of the subservice organizations.

The description indicates that certain control objectives specified in the description can be achieved only if complementary user entity controls assumed in the design of Northern Trust Corporation's controls are suitably designed and operating effectively, along with related controls at Northern Trust Corporation. The description does not extend to controls of the user entities.

We confirm, to the best of our knowledge and belief, that

a) The description fairly presents the Custody and Funds Services system made available to user entities of the system during some or all of the period April 1, 2017 to March 31, 2018 for processing their transactions as it relates to controls that are likely to be relevant to user entities' internal control over financial reporting. The criteria we used in making this assertion were that the description

i. presents how the system made available to user entities of the system was designed and implemented to process relevant user entity transactions, including, if applicable,

   (1) the types of services provided, including, as appropriate, the classes of transactions processed;

   (2) the procedures, within both automated and manual systems, by which those services are provided, including, as appropriate, procedures by which transactions are initiated, authorized, recorded, processed, corrected as necessary, and transferred to the reports and other information prepared for user entities of the system;

   (3) the information used in the performance of the procedures, including, if applicable, related accounting records, whether electronic or manual, and supporting information involved in initiating, authorizing, recording, processing, and reporting transactions; this includes the correction of incorrect information and how information is transferred to the reports and other information prepared for user entities;

   (4) how the system captures and addresses significant events and conditions other than transactions;
(5) the process used to prepare reports and other information for user entities;

(6) services performed by a subservice organization, if any, including whether the carve-out method or the inclusive method has been used in relation to them;

(7) the specified control objectives and controls designed to achieve those objectives, including, as applicable, complementary user entity controls and complementary subservice organization controls assumed in the design of the service organization’s controls;

(8) other aspects of our control environment, risk assessment process, information and communications (including the related business processes), control activities and monitoring activities that are relevant to the services provided.

ii. includes relevant details of changes to Northern Trust Corporation’s system during the period covered by the description.

iii. does not omit or distort information relevant to Northern Trust Corporation’s system, while acknowledging that the description is prepared to meet the common needs of a broad range of user entities of the system and their auditors, and may not, therefore, include every aspect of the Custody and Funds Services system that each individual user entity of the system and its auditor may consider important in its own particular environment.

b) The controls related to the control objectives stated in the description were suitably designed and operating effectively throughout the period April 1, 2017 to March 31, 2018 to achieve those control objectives if subservice organizations and user entities applied the complementary controls assumed in the design of Northern Trust Corporation’s controls throughout the period April 1, 2017 to March 31, 2018. The criteria we used in making this assertion were that:

i. the risks that threaten the achievement of the control objectives stated in the description have been identified by management of Northern Trust Corporation;

ii. the controls identified in the description would, if operating effectively, provide reasonable assurance that those risks would not prevent the control objectives stated in the description from being achieved; and

iii. the controls were consistently applied as designed, including whether manual controls were applied by individuals who have the appropriate competence and authority.

Very truly yours,

Peter Cherecwich
President – Corporate & Institutional Services

Steven L. Fradkin
President – Wealth Management

Jana P. Schreuder
Chief Operating Officer
III. NORTHERN TRUST CORPORATION'S DESCRIPTION OF ITS CUSTODY AND FUND SERVICES SYSTEM
APPLICABILITY OF REPORT

Northern Trust Corporation (Northern Trust or the Corporation) is a Chicago-based multibank holding company with subsidiaries and/or branches in the United States, Australia, Canada, Cayman Islands, China, Germany, Guernsey, Hong Kong, India, Ireland, Japan, Luxembourg, Malaysia, the Netherlands, the Philippines, Saudi Arabia, Singapore, South Korea, Sweden, the United Kingdom, and the United Arab Emirates. Northern Trust was established in Chicago in 1889 and is organized into two principal business units, Corporate and Institutional Services (C&IS) and Wealth Management, which provide the trust/custody and administrative services that are covered by this report. The Enterprise Operations (EO) and Technology business units encompass the operational activities for processing transactions and reporting, in addition to systems activities. See Figure 1 (p. 16) for an organization chart highlighting key activities covered in this report. To the extent controls significantly differ between business units or geographical location, the descriptions provided in this section of the report, “Northern Trust Corporation’s Description of its Custody and Fund Services System,” and in Section IV, “Northern Trust Corporation’s Control Objectives and Related Controls and Independent Service Auditor’s Tests of Controls and Results of Tests,” have been written to highlight these differences.

Northern Trust is divided into three geographical regions: APAC (Australia, China, Hong Kong, India, the Philippines, and Singapore), EMEA (Europe, Middle East, and Africa), and North America (the United States and Canada). Products and services offered vary throughout the individual regions. In the APAC region, Northern Trust provides global custody and asset administration, investment management, information, and consulting services. Northern Trust’s EMEA region is a provider of global custody and asset administration, investment management, information, and consulting services. In North America, Northern Trust provides services in the areas of trust/custody, investment management, treasury management, and information services.

This report is prepared to provide information on Northern Trust’s controls, as described in Sections III and IV, that are likely to be relevant to user entities’ internal control over financial reporting for Northern Trust’s custody and fund services clients in the C&IS and Wealth Management business units. The information in this report is prepared in accordance with the guidelines contained in the Statement on Standards for Attestation Engagements No. 18 (SSAE 18), Clarification and Recodification (of Standards for Attestation Engagements including No 16, Reporting on Controls at a Service Organization), issued by the AICPA and in accordance with International Standard on Assurance Engagements 3402 (ISAE 3402), Assurance Reports on Controls at a Service Organization, issued by the International Auditing and Assurance Standards Board.

This report is not intended to address controls related to services typically provided in an agent capacity to commercial banking clients, activities performed by Asset Management (AM), and certain Wealth Management trust/custody and banking clients.

Corporate and Institutional Services

C&IS encompasses U.S. and global custody-related services for securities traded in world markets as well as securities lending, asset management, cash management, and investment operations outsourcing services. Custody, fund accounting, transfer agency, and investment operations outsourcing are the principal products of C&IS covered by this report.

The major market segments served by C&IS are corporate pension and profit sharing funds subject to regulation under the Employee Retirement Income Security Act of 1974; public entities and institutions (asset portfolios of foundations, endowments, healthcare organizations, group trusts, mutual funds, and insurance companies); and a correspondent market segment that provides custody, systems, and investment services to bank trust departments and independent trust companies. C&IS also includes Global Fund Services, which includes fund accounting, investment operations outsourcing, and transfer agency services.

Wealth Management

Wealth Management encompasses personal trust/custody, investment management services, and estate administration. Northern Trust’s Wealth Management business unit has a national U.S. presence in the delivery of specialized private banking and personal trust/custody services. Wealth Management delivers these services through Northern Trust’s network of banking subsidiaries and/or trust/custody principal locations in Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New York, Ohio, Texas, Washington, Washington, DC, and Wisconsin. These full-service banking subsidiaries and trust/custody offices are predominantly private banking and personal trust/custody oriented; however, in certain locations, they also include various employee benefit trust/custody as well as master trust/custody clients.

Master trust/custody products allow clients to direct the establishment of separate accounts for cash, securities, and property held by Northern Trust. Master trust/custody products served by the Global Family Office Group and
Foundation and Institutional Advisers are covered by this report.

**Asset Management**
AM is a global multi-asset class investment manager servicing institutional and personal accounts globally, including C&IS and Wealth Management clients. The scope of this report covers the custody and fund services provided to AM and its clients.

**Enterprise Operations and Technology**
EO and Technology serve as the back-office for the processing of transactions for C&IS and Wealth Management custody clients, as well as certain investment operations outsourcing activities and AM clients. Custody operations are primarily served from centers in Bangalore, Chicago, Dublin, Guernsey, Limerick, London, Luxembourg, the Philippines, and Singapore. Operational activities of EO that support the services provided by C&IS and Wealth Management, as well as the information technology (IT) general controls described within the Technology section, are covered by this report.
NORTHERN TRUST CORPORATION’S CONTROL ENVIRONMENT

The control environment at Northern Trust begins at the highest level of the Corporation. The board of directors (the Board) and senior management play important roles in the oversight and management of the Corporation.

Specific environmental factors supporting the Corporation’s control environment include:

ORGANIZATIONAL STRUCTURE

The organizational structure (see Figure 1, p.16) provides the framework within which Northern Trust manages its activities. Northern Trust executes corporate-level strategic planning and oversight through the Management Group, as well as other corporate level committees. The business unit structure provides the framework to plan, execute, and monitor both corporate and business unit objectives within the overall framework of financial reporting standards. This structure supports the assignment of authority and responsibility and provides the necessary horizontal and vertical flow of key information.

The corporate and business unit organizational structure is assessed periodically (at least annually) by the Management Group and other corporate level committees for effectiveness in connection with the strategic planning process.

BOARD OVERSIGHT

The Board, together with its standing committees, provides an active oversight role in emphasizing the importance of internal control, including controls over client and financial reporting. The business and affairs of the Corporation are managed under the oversight of the Board. To assist it in carrying out its responsibilities, the Board has the following standing committees:

- The Audit Committee’s purpose is to oversee the accounting and financial reporting processes of Northern Trust and the audits of the consolidated financial statements of Northern Trust. The Audit Committee provides assistance to the Board in fulfilling its legal and fiduciary obligations with respect to matters involving the accounting, auditing, financial reporting, internal financial control, and legal compliance functions of Northern Trust. These include, without limitation, assisting the Board’s oversight of the integrity of Northern Trust’s consolidated annual and quarterly financial statements, Northern Trust’s compliance with legal and regulatory requirements, the Corporation’s public accountants’ qualifications and independence, and the performance of Northern Trust’s internal audit function and the Corporation’s public accountants. Additionally, the Audit Committee prepares the report required to be prepared by the Committee pursuant to Securities and Exchange Commission (SEC) rules for inclusion in the Corporation’s annual proxy statement.

- The Business Risk Committee (BRC) assists the Board in discharging its oversight duties with respect to (1) the risks inherent in the businesses of Northern Trust in the following categories: credit risk, market and liquidity risk, fiduciary risk, operational risk, compliance risk, and strategic risk and (2) the process by which risk-based capital requirements are determined.

- The Capital Governance Committee assists the Board in discharging its oversight duties with respect to capital management and planning activities of the Corporation and its consolidated subsidiaries.

- The Compensation and Benefits Committee assists the Board in discharging its duties and responsibilities relating to the compensation of the directors and executive officers of Northern Trust, and the employee benefit and equity-based plans of Northern Trust. The Committee also assists with management development and succession planning. Additionally, the Committee prepares the report required to be prepared by the Committee pursuant to SEC rules for inclusion in the Corporation’s annual proxy statement.

- The Corporate Governance Committee assists the Board in identifying and recommending candidates for nomination or appointment as directors; reviewing the Board’s committee structure and recommending appointments to committees; developing and recommending, to the Board, Corporate Governance Guidelines applicable to the Corporation; advising the Board on the appointment of a successor in the event of the unanticipated death, disability, or resignation of the Corporation’s Chief Executive Officer (CEO) after consultation with the Chairman of the Corporation’s Compensation and Benefits Committee; overseeing the procedures relating to stockholder communications with the Board and reviewing any proposal submitted by stockholders; overseeing the annual evaluation of the Board and its committees; and assisting the Board in discharging its oversight duties with respect to corporate citizenship and social responsibility matters of significance to the Corporation and its consolidated subsidiaries.

- The Executive Committee is empowered to act for the Board, to the full extent permitted by law, between meetings of the Board.
RISK MANAGEMENT ACTIVITIES
Northern Trust involves four major levels of participants in the risk management process:

- Board committees oversee the risk management policies, processes, personnel, and control systems, including those related to IT risk. The Board committees that oversee various aspects of risk management are the Audit Committee, the Business Risk Committee, the Capital Governance Committee, and the Compensation and Benefits Committee.

- The Global Enterprise Risk Committee provides corporate oversight to various committees responsible for the review and approval of risk management strategies, policies, management practices, and tolerance levels, including those related to IT risk and product risk based on an understanding of inherent risks in day-to-day activities. The primary committees are Asset and Liability, Compliance and Ethics Oversight, Credit Risk, Model Risk Oversight, Operational Risk, and Fiduciary Risk.

- Risk Management at the corporate level, in support of each business unit, establishes written controls, develops appropriate assessment tools and internal testing programs, and monitors internal and external events for specific categories of risk based on direction from the corporate oversight committees.

- Business/Functional unit managers and other professionals are directly engaged in risk management processes within their area of responsibility.

Recognizing the existence of specific categories of risk, the members of the Board and Northern Trust employees, as described above, are responsible for identifying risk factors and conditions, assessing the impact of these risks to the Corporation, establishing acceptable risk tolerance levels, implementing sound control policies and practices, and evaluating the effectiveness of risk monitoring tools.

More specifically, Northern Trust’s business units, aided by Risk Management, are primarily responsible for risk management activities and use various techniques to assess risks inherent in products or services, including a formalized periodic risk assessment process. The goal is to understand the risks, including regulatory and financial reporting risks, establish cost-effective controls to manage these risks to acceptable levels of exposure, and then to monitor and manage these risks. Control activities include segregation of duties, approvals, reconciliations, and reviews and monitoring of operating performance.

MONITORING AND OVERSIGHT
Monitoring and corporate oversight activities are accomplished through a variety of methods. Internal oversight and monitoring are accomplished by the Board and senior management, activities of Audit Services, SOX 404 reviews, the Operational Risk Committee, the Compliance and Ethics Oversight Committee and the activities of the Global Compliance Testing group, the Credit Risk Committee and the activities of the Credit Review function, the Fiduciary Risk Committee, activities of the Legal Department, and through various other committees.

Highlights of oversight activities are described below:

- Board and senior management involvement and committee and other oversight activities have been described earlier. In addition, the Audit Committee of the Board has direct access to the General Auditor of the Corporation and the Corporation’s independent registered public accountants.

- Audit Services has full authority to examine aspects of the Corporation’s operations and is independent from daily processing. The General Auditor has reporting responsibility to the Audit Committee and has an administrative reporting line to the CEO. It is the duty of Audit Services to make examinations from time to time of assets owned by the Corporation or held by it in a fiduciary capacity and of the system of internal and accounting controls. Audit Services performs an ongoing audit program encompassing custody, fund-services related activities, and key controls.

Established working groups provide business leadership and direction over the content and quality of internal control reports made available to clients. The groups comprise representatives from Audit Services, Risk Management, and business unit management.

TECHNOLOGY AND VENDOR OUTSOURCING
The Corporate Outsourcing Risk Committee provides guidance and advice to the business units and primary working groups involved in executing due diligence and providing risk management oversight for significant outsourced activities.

Northern Trust’s Outsourcing Risk Management Program has an established framework process for evaluating risk associated with outsourced activities. The Third-Party Outsourcing Committee provides guidance and oversight to the review process for proposed and existing third-party outsourcing arrangements. Outsourced activities are tiered and risk rated according to criticality, size, and risk profile as well as the value of the vendor relationship to the business. The risk profile considers if the vendor has access to any Northern Trust systems on site or remotely; will access, store, transmit, or process Northern Trust information.
classified as “Highly Sensitive,” “Sensitive,” or “Not Sensitive-Business Use” outside of the Northern Trust network; or will support a critical business function. These factors prescribe specific due diligence steps to be completed at preestablished frequencies. These due diligence steps include an inherent risk assessment of the vendor and the service, a financial review, a third-party risk assessment, as well as a third-party audit (as needed) to assess compliance with Northern Trust’s standards and practices.

Due diligence steps are intended to assess service providers’ capabilities in the following areas:

- **Financial Stability** Financial stability of the Third Party Service Provider (TPSP) is an important indicator of its ability to adequately support and develop the outsourced service. An underfinanced provider may fail, leaving Northern Trust with an inability to serve clients.

- **Security and Confidentiality** The TPSP should exhibit compliance with Northern Trust’s security standards and confidentiality practices.

- **Controlled Technical Infrastructure** Northern Trust expects the TPSP to have created a technical infrastructure that is well controlled, scalable, and appropriate to the application’s present and future requirements.

- **Disaster Recovery and Business Continuity** Adequate disaster recovery plans are necessary to protect against extended outages. In addition, the TPSP should have an adequate infrastructure to provide for business continuity capabilities appropriate to the service provided.

- **Auditability** Northern Trust must have the right to perform an independent review of the TPSP as defined via a clause in the contract.

- **Contract Terms and Conditions** Contract standards have been developed to help protect Northern Trust and meet Federal Financial Institutions Examination Council guidelines.

**HUMAN RESOURCES CONTROLS**

The competence of employees is a key element of the control environment. Northern Trust maintains a commitment to the development of its people. This commitment to excellence is expressed in the Corporation’s Human Resources policies and related Human Resources programs. Specific factors of the commitment to excellence include sourcing and acquisition, training and development, and performance management of talent. These are briefly discussed below:

- **Northern Trust’s commitment to excellence starts with the sourcing process, which is the joint responsibility of the Human Resources Department and business unit managers. Hiring decisions are based on various factors, including prior relevant experience, past accomplishments, educational background, and professional licensing, where required. Additionally, new employees are screened in accordance with regulatory requirements and market practices where applicable.**

- **The Corporation also has extensive training and development programs to enable employees to meet the requirements of their current positions and to develop them for future career opportunities. Employees may choose to participate in programs related to development and training through Human Resources or be required through their business unit to develop the skills or technical background required of the position, licensing, and continuing education.**

- **Northern Trust’s commitment to development includes a structured biannual performance management process. The process is co-managed by each employee and his or her manager. The process entails the development of specific, quantifiable performance objectives for the coming period; periodic discussions of progress in meeting those objectives; and a formal review of the employee’s overall performance in the current position, as well as career development discussions to help develop the individual for future career opportunities.**

- **Integrity and high ethical standards are qualities essential to the business of Northern Trust and are viewed as fundamental standards of behavior for employees. At Northern Trust, the standards of integrity and ethics are demonstrated daily by the personal conduct of senior management, the employee standards of conduct, and various controls, including a code of ethics; policies for the handling of confidential information; and policies stipulating that employees comply with laws, regulations, and corporate policies as a condition of continuing employment.**

- **In addition, each employee is expected to report suspected violations of or exceptions to these policies by other employees of the Corporation or outsiders. Recognizing the sensitive nature of these situations, employees have several options for bringing these situations to management’s attention. Employees may contact their manager, their Human Resources representative, the Employee Relations Department,**
the Corporation’s Equal Employment Opportunity Officer, the Chief Compliance Officer, or the Network, which is an independently operated confidential hotline.

ASSIGNMENT OF AUTHORITY AND ACCOUNTABILITY

Corporate Policy Instruction, the Corporate Controller’s Manual, Northern Trust Corporation Policies, and Fiduciary Policies document the basic framework on which the Corporation’s system of internal control is based. Additional guidance on accounting practices and operational and compliance controls is documented in various corporate and departmental instructions, procedures, and policies.

The assignment of authority and responsibility within Northern Trust includes establishing relationships and authorization levels necessary to execute specific business decisions and objectives. These begin with senior management and end with individual responsibility.

The Corporation is organized by key revenue producing business units, with processing and infrastructure support from the EO and the Technology business units. The business unit heads and their direct reports are primarily responsible for management and operating decisions within each unit. The heads of these units in conjunction with the Chairman and CEO, President, Chief Operating Officer, Chief Financial Officer, Chief Risk Officer, General Counsel, and the Head of Human Resources comprise the Management Group. Significant operating and management decisions, depending on type, are reviewed by and typically receive approval from the Global Enterprise Risk Committee (and underlying committees described in Risk Management Activities), the Management Group, the CEO, and, as appropriate, the Board or committees thereof.

Written job descriptions provide a job summary; basic duties; and responsibilities; and a description of knowledge, skills, and experience required. Management positions are clearly defined with management duties appropriate to the level of management, and reporting relationships are maintained through the Human Resources system.

FRAUD PREVENTION AND INVESTIGATIONS

There are several corporate documents that address fraud:

- Global Fraud Risk Program - Sets out the minimum standards for reporting and investigating unusual activity and disclosure of suspicious activity to the authorities. Reflects the responsibilities of the Fraud Prevention Unit. It also describes Fraud Prevention’s proactive review of alerts and suspicious activity to prevent fraud and, losses and mitigate risk. This unit also provides advice and guidance to the Business Units so that they may more effectively fulfill their responsibility to implement processes and procedures to mitigate fraud risk within their areas of responsibility.

- Global Anti-Fraud Policy – Assigns responsibility for implementing appropriate fraud prevention and detection controls and conducting fraud-related investigations

- Unusual Activity Reporting Guidelines – Provides guidance to employees on reporting suspected fraudulent or inappropriate actions and/or activity

- Identity Theft Prevention Program - Documents activities performed by the Company in an attempt to detect, prevent, and mitigate Identity Theft

- Code of Business Conduct and Ethics – Encourages honest and ethical conduct, compliance with applicable laws, and deterrence of wrongdoing in the execution of legitimate business

- Standards of Conduct Policy – Defines the standards to which all staff members are expected to adhere in conducting business on behalf of Northern Trust and its subsidiaries with clients, prospective clients, vendors, investors in securities issued by Northern Trust, the public, and other staff members

- Information Security and Technology Risk Management Policy – Sets out the requirements for the protection of client and proprietary information and associated technology resources. Security measures are intended to preserve the integrity of client relationships, protect valuable information assets, and protect the Corporation's legal interests

- Funds Transfer Policy – Intended to mitigate risks associated with receiving and processing authorized client directions for funds transfers

Key general control practices at the line of business level to reduce the likelihood of fraud and increase fraud detection include, but are not limited to:

- Transaction instructions received via an unsecure communication medium such as fax or e-mail are subject to additional authentication controls

- Individual authorization and approval limits for transactions performed when the client is not present, to mitigate the risk of transactions processed inappropriately or incorrectly and to ensure the appropriate level of review before release
Segregation of duties is implemented where appropriate so that no one individual can control conflicting aspects of a transaction.

System access is granted to employees subject to approval by business unit management and on the basis that access should be restricted to the relevant functions required to meet job responsibilities. Access is reviewed and certified by managers annually.

Reconciliations of cash and securities movements are typically completed on a daily basis and at the transaction level. Exceptions are assigned to appropriate partners for investigation and resolution.

Exception management processes require regular reporting, ongoing attention to unresolved exceptions, and emphasis on, and escalation procedures for, high-value and/or aged exceptions.

Customer assets are maintained in separate accounts.

Northern Trust also employs a number of automated systems that are designed to detect and/or prevent a variety of fraud types, including check fraud, ATM fraud, identity theft, unauthorized system access, theft of information, and internal fraud.
The highlighted areas below are within the scope of this report:

Figure 1

Board of Directors and Committees
Thereof

President & Chief Executive Officer

Chief Operating Officer

Audit Services

Management Group

- Risk Management
  - Business Unit Risk Management Oversight
  - Credit Risk Management
  - Fiduciary Risk
  - Information Security & Technology Risk
  - Market & Liquidity Risk
  - Operational Risk
  - Regional Risk Management
  - Risk Control
  - Strategic Risk

Corporate Controller
Corporate Services
Corporate Social Responsibility
Human Resources
Investor Relations
Legal
Treasurer

Primary Locations:
- Bangalore
- Chicago
- Dublin
- Guernsey
- Limerick
- London
- Manila
- Melbourne
- Pune
- Singapore
- Tempe

Alternatives
Banking & Loan Operations
Cash
Client & Investment Manager Servicing
Derivatives
Reconciliations
Securities Operations

Primary Locations:
- Abu Dhabi
- Amsterdam
- Beijing
- Chicago
- Dublin
- Frankfurt
- Guernsey
- Hong Kong
- Limerick
- London
- Luxembourg
- Manila
- Melbourne
- Singapore
- Stockholm
- Toronto

Architecture & Innovation
Cross Technology Services
Development
Infrastructure
Security

Primary Locations:
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Illinois
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New York
- Ohio
- Texas
- Washington
- Washington, D.C.
- Wisconsin

Global Fund Services
Capital Markets

Global Investor Group

Private Client Advisory
Wealth Advisory

Global Family Office Group

Foundation & Institutional Advisers

Personal Client Services

Enterprise Operations (EO)

Technology

Corporate & Institutional Services (C&IS)

Wealth Management

Asset Management

- Active Equity
- Alternatives
- Global Equity Index
- Global Fixed Income
- Global Equity Trade Desk
- Investment Administration
- Managed Accounts
- Group Multi-Manager Solutions

Primary Locations:
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Illinois
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New York
- Ohio
- Texas
- Washington
- Washington, D.C.
- Wisconsin

Primary Locations:
- Chicago
- Hong Kong
- London
- Stamford
- Toronto
- Tokyo
- West Palm Beach

Chief Operating Officer

Personal Client Services

Global Family Office Group

Foundation & Institutional Advisers

Primary Locations:
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Illinois
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New York
- Ohio
- Texas
- Washington
- Washington, D.C.
- Wisconsin
TRANSACTION PROCESSING
The following describes Northern Trust’s transaction processing environment and related controls surrounding the administration, servicing, and reporting of client accounts.

ACCOUNT ADMINISTRATION
Administration of accounts is primarily conducted by the Account Administration and Account Servicing teams within the C&IS or Wealth Management business units of Northern Trust. Accounts are administered pursuant to trust agreements, investment management agency contracts, or custodial agency contracts. Examples of the types of clients or entities that are parties to those agreements or contracts include, but are not limited to, commingled investment funds, companies/corporations, not-for-profit entities, public funds, insurance trusts, charitable split-interest trusts, conservatorships/guardianships, and employee benefit plans. Account Administration acts upon the direction of client-authorized parties and exercises discretion only with respect to responsibilities prescribed by the terms of the governing instrument.

Prospective client relationships are considered for approval in accordance with established policies. Designated committees and/or other specific parties review business of significant size or complexity to determine that Northern Trust can fulfill the responsibilities proposed for it to assume. The Legal Department and/or other designated parties review relevant documentation to help ensure provisions do not conflict with applicable laws or regulations. Final agreements or contracts are signed by the client or an authorized officer of the client and an authorized officer of Northern Trust. Agreements and/or contracts are either securely retained in physical form or stored electronically in an imaging system.

Account Administration coordinates with Transition Services and other business units within Operations, C&IS, and Wealth Management to properly structure accounts within the relationship and collect and record assets. Pertinent account coding information per client documentation is either entered by Account Administration into the applicable account management system or provided to Operations for entry. Account Administration, Operations, or Compliance periodically reviews the Trust System to help ensure that accounts have been coded in accordance with client documentation.

In their capacity, Account Administration may receive instructions from authorized client personnel directing transactions. Examples of directed transactions include, but are not limited to, disbursements, transfers between related accounts, fee and expense payments to service providers, capital calls, and fund purchases. Under the terms of certain agreements, Account Administration may initiate such transactions within authority limits or in accordance with approval processes as outlined in established business unit procedures. Upon receipt of client instructions, Account Administration reviews the instructions and applicable governing documentation to verify the instruction was received from a client-authorized party. Additionally, certain disbursement instructions are authenticated in accordance with business unit procedures. Once transaction instructions are reviewed for authorization, Operations or Account Administration executes the instructions and enters the transactions into the Cash Movement System or Trade Order Entry System. Transactions are reviewed to help ensure they are processed accurately.

SECURITIES MOVEMENT
Securities movement functions include the free receipt and delivery of client securities for the purposes of transitions, free receipts, distributions/free deliveries, transfers between accounts (TBAs), and fund conversions. Security movements are processed through depositories, various subcustodians, or the Depository Trust Company (DTC) custody vaults based on type of security. The majority of transactions are processed through depositories via book entry. Transition Services helps coordinate most security movement transactions directly with the depositories or local subcustodian networks. The Trade Processing team handles processing for physical domestic U.S. assets.

Transitions
The transition process is initiated when a client directs Northern Trust to receive all or some portion of the client’s security holdings from an outside party. Written instructions from the client authorizing the transition are reviewed by Account Administration, who, in turn, instructs Transition Services to receive the assets.

U.S. securities are loaded into the Trust System on or before transition date to meet settlement deadlines, with global market securities being loaded on transition date. Processors input asset identification number, shares/carrying value, cost, and trade/settlement details into the Trust System and coordinate with Asset Coding to set up new securities on the Trust System. SWIFT free receipt messages are issued in order to notify Northern Trust’s subcustodians or depositories in relevant markets for global securities.

Accompanying the asset list are securities that were held physically by the client or their prior custodian. These securities are deposited to the proper depository or vault and placed on record in the client’s account on transition date. Physical security transactions are recorded on the Security
Movement and Control System (SMAC) or Trust System for tracking purposes.

On transition day, the security receipts are monitored as they enter the depository position and automatically post into the client's account on the Trust System. Physical securities expected are posted and receipt of the securities is confirmed with the vault area upon arrival. Following settlement date, assigned staff reconciles client accounts on the Trust System to the depository or subcustodian records to help ensure securities are properly recorded. If discrepancies exist as a result of unmatched securities or carrying values, exceptions are noted, researched, and reported to management until cleared. Assigned staff reviews security activity online or via Trust System reports, and upon receipt of a statement from the delivering custodian/trustee or client, a final reconciliation of securities received is completed. A secondary review of the transition file is performed and evidenced in the file for account transitions.

**Free Receipts – U.S. Assets**

New or existing clients may send securities not involved with an initial transition to be deposited into their accounts either in the physical form or via electronic book entry through a depository organization [i.e., the Federal Reserve (FED) or DTC]. Trade Processing monitors the various depositories for free receipt assets being delivered to Northern Trust for clients. Discrepancies are researched and resolved. U.S. physical free receipts are sent to the Trade Processing team along with a delivery ticket that includes the client's account number, the number of shares being sent, and a description of the securities. Trade Processing counts the securities received, verifies the information on the delivery ticket, and creates an in-house SMAC ticket. An approver within Trade Processing verifies the SMAC ticket information and posts the receipt to the Trust System.

**Free Receipts – Global Assets**

Existing clients may send securities not involved with an initial transition to be deposited into their accounts. Prior to taking physical custody of free receipt securities, the originating business unit (e.g., Investment Manager Liaison Group, Transition Services, Account Administration, etc.) posts an entry to the Trust System describing the security attributes, pending delivery. As required, physical securities received are registered in the nominee company name. Upon receipt, the physical securities are independently confirmed by the Trade Processing team to post in the Trust System and filed in the vault once the securities have settled in the Trust System.

**Distributions/Free Delivery**

The distribution process is initiated when the client directs Northern Trust to distribute all or some portion of the client's security holdings to an outside party or another account. The originating area verifies that the client individual sending the instruction is an authorized signer for the related account and then forwards the distribution instructions to Transition Services or Trade Processing via a completed standardized form sent through e-mail, hard copy, or fax.

For securities held in a Northern Trust or DTC Custody vault, authorized staff inputs the request for removal into the SMAC System. The security is then delivered to the proper recipient per client instructions. Once the securities are delivered, they are then removed from the Trust System.

For securities held at a depository, securities movements are initiated through input to the Trust System, which sends the instruction via an automated interface to the depository. Securities movements may also be initiated by authorized staff inputting the request for the security movement via the appropriate depository terminal. The depository receives the request and delivers the security out of Northern Trust's account to the new destination via book entry. A confirmation of movement is received from the depository.

For distribution of assets held at a subcustodian, authorized Northern Trust staff sends SWIFT delivery instructions to the applicable Northern Trust agent bank to arrange for the free delivery of the assets to the successor custodian. Deliveries are for an agreed-upon settlement date and to the successor's pre-advised agent bank.

The distribution process is completed with a final transaction that shows the security has been removed from record in the client's account on the Trust System. Pending cash receipts related to distributed securities (usually in respect of pending income or tax receivables) are identified and transferred to the successor custodian on a predetermined basis.

**Transfers between Accounts (TBAs)**

TBAs are initiated when the client directs Northern Trust to transfer assets between two or more of their accounts at Northern Trust. Written instructions from the client authorizing the TBA are reviewed by Account Administration, who, in turn, instructs Transition Services or Trade Processing to move the assets. Instructions and the list of securities to be transferred are reviewed by the assigned staff. On the instructed date, the securities are transferred to the receiving account(s) based on the appropriate cost method. The following day, the security transfers are reconciled to the original instructions and discrepancies are researched and resolved.

**Conversions/In-Kind Exchange**

Conversions into/out of a fund are initiated when a client or fund manager directs Northern Trust to deliver/receive securities to/from a fund company for investment into/out of a commingled or mutual fund. Affirmation of instructions is communicated between Account Administration or the fund...
CASH MOVEMENT

Global Payment Operations is responsible for the data input, processing, and reconciliation of approved cash movement activity to the Trust System. Northern Trust utilizes various cash movement systems to initiate and process cash transactions. In the United States, reports are available throughout the day on the Cash Movement System that notifies operating personnel of unmatched cash transactions. Operating personnel research and resolve unmatched cash movements based on a review of the intraday reports or overnight produced exception reports. Unresolved exceptions are reported daily to management.

Client Payment Support (CPS)

CPS is the primary business unit that processes cash payments on behalf of trust and custody clients. Upon receipt of a faxed or e-mailed letter of direction for a cash payment, the document is automatically imaged and routed by account number to the appropriate Account Administration group. Account Administration verifies the letter of direction is from a client-authorized party and authenticates the instruction in accordance with business unit procedures. The payment is then electronically routed back to CPS for entry into the Cash Movement System.

The Cash Movement System requires a separation between entry of a payment and independent approval before the payment is released. The system also has controls, which validate that the payment was approved by staff with the appropriate internal authority and that the payment is properly funded prior to release of the payment.

International Wire Desk (IWD)

IWD currently handles requests for Wealth Management clients nationwide, including GFO and Private Banking clients, as well as other Northern Trust business units. Requests are received directly from clients via fax, e-mail, or telephone. Upon receipt of requests, information is reviewed to identify Dodd Frank versus non-Dodd Frank wire activity for appropriate processing. Authentication and disclosures are completed by IWD as per currently established Northern Trust Funds Transfer Policy and Dodd Frank Regulation. Wires are initiated, approved, and Dodd Frank disclosures are mailed to clients. Wires are initiated via various Cash Movement systems, which have built-in controls that require separation of duties between initiation and approval.

TRADE COMMUNICATION AND SETTLEMENT

Trade instructions covered by this section include security movements (e.g., equities, bonds, etc.) and cash-related transactions.

U.S. Trade Communication

In the United States, Trade Processing teams receive trade information electronically from brokers via the DTC Interactive Institutional Delivery (IID) System on trade date or the day after. The Trade Processing teams or the investment manager reviews the trade information for accuracy and then “affirms” the trade via electronic interface with the IID system. Affirmed trades load automatically onto the Trade System for automated settlement. For trades that are not communicated electronically, a manual instruction from the investment manager, usually fax, is compared to broker details on the IID confirmation.

The Trade Processing teams also receive trade instructions from investment managers electronically via SWIFT through the Trade Capture System, which electronically receives trade information from the external investment manager’s system in a file that is loaded to the Trade System. Each investment manager has a unique ID to provide transmissions. Trades sent electronically through the Trade Capture System are systematically matched to confirmations loaded to the Trade System through DTC’s IID system and the trades are affirmed on behalf of the investment manager.

The Trade Capture System validates trades are received from an authorized source through the use of identifier and account numbers and other relevant account data and trade figures to help ensure transactions are properly recorded and processed before a trade is sent to the subcustodian or depository. Exception reports with buy or sell fails and overdraft positions are generated by the Trade System. Items on these reports are researched and resolved daily. In addition, the Trade System has exception queues and generates exception reports, which summarize activity and potential problems with a trade, such as incomplete
information, duplicate trades, and rejects. The Trade Processing teams research and resolve the items on these queues and reports daily. Investment managers have access to electronic delivery information systems (e.g., Management Reporting, SWIFT, etc.), including cash balances, pending trades, settled or failed transactions, and asset summaries.

**Global Trade Communication**
The Global Trade Processing team typically receives global trade instructions from investment managers via SWIFT, the Trade Capture System, or facsimile. The Fax Administration team receives the trades sent via fax through the relevant fax imaging system and reviews the instructions for accuracy. These imaged trades are forwarded to the Global Trade Processing team who inputs the trades into the Trust System. Trades that are received through an automated method are systematically validated by the Trade Capture System against various validation codes, including checks that trades are received from authorized sources through the use of identifier and account numbers, instruction format accuracy, and that the client has adequate account holdings to make the trade. Should a trade instruction, regardless of instruction method, not pass through the validation stage, it routes to a work queue where it is reviewed and processed accordingly. Once the trade has been validated and processed, trade instructions are automatically sent to the subcustodian/depository via a SWIFT message.

**U.S. Trade Settlement**
Once a trade has been input into the Trade System, an automated matching application compares the trade details to the details on the security wire transmitted by the broker through the depository systems. Once the trades pass the auto-match validation process, the trades are systematically settled at the depository and participant records are automatically updated. A security movement ticket is produced in the Trade System and used by trade technicians for trades that are not deliverable due to restrictions or insufficient positions. Various trade statuses (e.g., incomplete, settled, etc.) allow the Trade Processing teams to work through problem trades and resolve or communicate these problems to the applicable Client Servicing team for resolution.

Northern Trust is linked to the Federal Reserve Bank's National Book Entry System via its Securities Transfer System (STS) software. Buy transactions that are received at the Federal Reserve are matched to the pending buys on the Trade System and are then auto-posted to the Trust System. Completed sells are systematically validated to determine if a trade is eligible for delivery. The process validates that shares are available for delivery in the account. Once the trade passes the validation, the transaction is then auto-released. Sales returned to Northern Trust are referred to the Trade Processing team for resolution prior to subsequent redelivery. If a purchase is received and there is no instruction from the investment manager or client or if there is a trade discrepancy, the trade is researched and resolved by the Trade Processing team. If the exception cannot be resolved, the trade is referred to the applicable Client Servicing team for research before returning the shares to the delivering party. Total buy and sell activity per the Federal Reserve Bank reports is matched daily with the related total buys and sells posted to client accounts to balance daily settlement activity.

The majority of DTC trades are delivered and posted via the Trade System. Actual security movement at DTC is compared with completed trades on the Trade System and exceptions are automatically routed to an online exception queue. The Trade Processing team electronically routes exceptions to the appropriate business unit for resolution. Matching of trade instructions to confirmations or securities deliveries and posting of trades is a real-time process. Total buy and sell activity per the DTC is matched daily to the buys and sells posted to client accounts.

Trade Processing processes securities, purchases, and sales settling in certificate form and the reregistration of securities. Purchases and sales of physical securities are monitored via the SMAC System until final disposition (to the vault or delivered out). See the information under Northern Trust Securities Vault within the Securities Custody and Reconciliation section.

**Global Trade Settlement**
Global custody trades settle through Northern Trust’s subcustodians or depositories where Northern Trust has a direct relationship (e.g., Crest, Euroclear, and Clearing and Depository Services). The Global Trade Settlements team is notified by the subcustodian or depository of trade settlements via a SWIFT or SWIFT-type message confirming the details of the transaction. These details are verified through a direct transmission to the Trust System and if the trade details match, the trade is automatically settled. Differences identified are researched and provided to the applicable Client Servicing team to determine if a trade amendment is necessary. The Client Servicing team communicates necessary amendments to the Global Trade Processing team or contacts the investment manager or client for trade verification.

Settlements of physical securities outside the United States occur at Northern Trust’s London Branch. The processing of physical settlements in London is performed in a manner consistent with that described above for U.S. Trade Settlement.
Failed Trade Monitoring
Daily, a report is produced from the Trust System that shows projected settlements plus failed settlements. Where Northern Trust has a direct relationship with a depository, proprietary systems and reports are reviewed. If a subcustodian is utilized, this information is provided by the subcustodian. Subcustodians report unsettled trades to Northern Trust with an explanation of reasons for the delayed settlement. Settlement clerks review the projected/failed trade reports and perform necessary research and resolution in accordance with market practice. This information is then forwarded to the Client Servicing team responsible for the account for possible investigation with the investment manager or client. If it is determined that the counterparty needs to amend their trade instructions, the Client Servicing team will notify the client or investment manager, or if it is determined the Northern Trust instructions need to be amended, the Trade Processing teams follow trade amendment procedures to make the correction. If the failure cannot be resolved, the Trust System is updated with a fail reason code. Investment managers and clients can access failed trade information via electronic information systems (e.g., Management Reporting, auto e-mail, or SWIFT).

TRADE COMMUNICATION AND SETTLEMENT – DERIVATIVES Custody
Derivatives contracts are generally initiated by investment managers to rebalance or protect the value of client portfolios. These contracts are entered into with applicable brokers/third parties and do not represent physical securities held or custodied with depositories. Derivatives transactions generally fall under one of three forms: exchange-traded derivatives (ETD), over-the-counter (OTC), and Central Counterparty (CCP) Clearing. Brokers may require collateral or margin to be maintained against all or a portion of the contracts.

Processing teams in Chicago, Bangalore, and London are responsible for recording derivative contracts, which are processed based on clearing broker or investment manager instructions for ETD, OTC, and CCP contracts. Each location utilizes the Derivatives Trade Capture System to capture ETD, OTC, and CCP instructions. Northern Trust receives instructions from investment managers or approved brokers to settle derivative-related cash flows such as option premiums, swap fees and resets, cash and noncash collateral, and margins.

Outgoing fund movements (regardless of product) are subject to the corporate Funds Transfer Policy requirement to authenticate instructions. Authentication of transactions is performed either by use of a secure means of instruction initiation (such as SWIFT or File Transfer Protocol), callback, or by establishment of a securely held standing settlement instruction (SSI). Authentication of instructions or of SSIs is performed by the Derivative Static Data Group.

The Derivatives team uses the Derivatives Trade Capture System to capture ETD trade information provided by the investment manager’s appointed clearing brokers or investment manager’s instructions, which automatically route to the Trust System from the Derivatives Trade Capture System. In order to process electronic feeds, the Derivatives team receives notification from investment managers to set up the account in the Derivatives Trade Capture System. Access to accounts at the clearing broker must be obtained from investment managers. Subsequent to trade capture, the Derivatives Trade Capture System calculates the daily changes in the mark to market settlement requirements. This calculated amount is then matched to the faxed investment manager instructions prior to settlement. For those accounts that do not have a broker feed, and where mandated by the investment manager, trades are manually added to the Derivatives Trade Capture System. Discrepancies are identified and followed up with clearing broker and/or investment manager. A system-generated error queue identifies instances where trades fail to process straight through to the Trust System. This queue is reviewed daily by the Derivatives team to identify and resolve exceptions. Review of the queue is evidenced by sign-off on the daily checklist.

On a daily basis, the Derivatives team reconciles ETD custody positions between the Trust System and the Derivatives Trade Capture System. Reconciling items are downloaded into a reconciliation data repository and are researched and resolved in a timely manner in accordance with corporate standards.

Investment managers send instructions regarding assets to be designated as collateral, which are then sent to the broker via free delivery utilizing various securities settlement systems. A second individual independent of the input into the securities settlement system approves the transaction prior to processing. For all securities, assets are coded on the Trust System to restrict trading. If the account does not have available collateral at the time of delivery request, the Collateral team contacts the investment manager who in turn instructs the Derivatives team how they will fulfill the pending collateral request.

The Derivatives team receives instructions from investment managers to process OTC and CCP transactions and associated settlements. Trade instructions are either electronically fed or manually input directly to the Trust System and/or Derivatives Trade Capture System as required, and the input is verified by a second independent individual. For broker and investment manager statements received, the Derivatives team performs OTC trade reconciliation between the Trust System or Derivatives
Trade Capture System and investment managers. The reconciliations are secondarily reviewed for completeness as evidenced by sign-off on the daily checklist. Exceptions are researched and narrated in line with corporate standards and reported to management on a daily and weekly basis.

For CCP activity, cash settlements are reconciled between the Trust System and the investment manager or broker. Exceptions are researched and resolved in line with corporate standards.

As agreed with certain clients, a position management process is in place to support the systematic netting of CCP positions. CCP trade netting is monitored for accuracy and exceptions are researched and resolved in accordance with business unit procedures.

In addition, the Derivatives team monitors queues or receives system-generated reports or e-mails to ensure electronic transmissions from investment managers or clearing brokers have been captured into the Derivatives Trade Capture System and Trust System. Discrepancies and potential problems such as incomplete trades are identified automatically and are resolved by the Derivatives team via system-generated exception reports or via system-generated e-mails.

**Derivatives Investment Operations Outsourcing (D-IOO)**

Northern Trust clients and their investment managers enter into ETD, OTC, and CCP derivatives contracts with brokers/counterparties for various trading strategies. Most executed transactions are received electronically and communicated to Northern Trust by the investment manager's front office system. The Derivatives Investment Operations (D-IOO) team monitors exception queues and reports to ensure electronic transactions received have been captured in the Derivatives Trade Capture System and Trust System. Exceptions are researched and, where possible, resolved prior to the end of day. Completeness of this process is evidenced by sign-off on the daily checklist.

The D-IOO team is responsible for providing cash and derivative positions to the investment manager on a daily basis. Positions between the middle office book of record and the investment manager's trade order management system are reconciled daily. Differences between the client front office and the Northern Trust middle office are reported to clients and D-IOO management daily. In addition, positions and market values are reconciled daily to the brokers/counterparties.

ETD, OTC, and CCP trade instructions not received electronically must be manually input into the Derivatives Trade Capture System or the Trust System by the D-IOO team. Manually input transactions are verified by a second individual, independent of the input, either through a system-enforced authorization process or through a manual review of post-capture system output. Completeness of manual capture is evidenced by sign-off on the daily checklist.

The D-IOO team reconciles ETD positions and cash between the Derivatives Trade Capture and the broker statements on a daily basis. Cash balances are also reconciled between the Trust System and the broker statements at least three times a week. Reconciliations are reviewed for completeness as evidenced by sign-off on the daily checklist.

The D-IOO team reconciles ETD positions and cash between the Derivatives Trade Capture and the broker statements on a daily basis. Cash balances are also reconciled between the Trust System and the broker statements at least three times a week. Reconciliations are reviewed for completeness as evidenced by sign-off on the daily checklist.

The D-IOO team reconciles OTC and CCP positions per the Derivatives Trade Capture System to counterparty or broker statements as received. The reconciliation is reviewed for completeness as evidenced by sign-off on the daily checklist.

For certain clients, the D-IOO team also affirms OTC trades with counterparties. Broker confirmations are received and reviewed, and outstanding confirmations are tracked and reported to management and clients until resolution using a confirmation platform.

Open derivative positions are revalued daily, based on market value feeds from the security master database, and derivative IOO trades are automatically fed into the Trust System to generate client reporting.

For OTC settlements, the D-IOO team verifies the settlement details with the counterparty on or before value date and prior to processing. Outgoing instructions are then secondarily reviewed and sent to the appropriate external custodian.

The D-IOO team monitors failed trades using a combination of the Outsourcing System, clearing broker files, and custodian communications. Failed trades are researched and resolved on a daily basis, and are reported to management.

**ACTIVE COLLATERAL MANAGEMENT**

Northern Trust clients and their investment managers enter into legal agreements with their counterparties to agree the terms to mitigate counterparty credit risk associated with instruments detailed in the legal agreements. These agreements identify eligible collateral, initial collateral
thresholds, collateral haircut rates, minimum transfer amounts, etc. Under the Active Collateral Management offering, Northern Trust monitors these agreements and negotiates the collateral exchanges with the clients’ counterparties. All master agreement terms and related collateral annexes are input in the Collateral Management System. The input is secondarily reviewed and approved.

On a nightly basis, the following items are automatically fed into the Collateral Management System to determine the collateral requirements for the agreement:
- Open trades and exposures extracted from the management reporting database
- Trade/valuation files from clients and Northern Trust
- Market value of collateral assets revalued daily, based on market value feeds from the security master database
- Market data from the Asset Coding System for the calculation of collateral, including interest rates and foreign exchange rates

The following morning, a Collateral team analyst reviews the feed status manager in the Collateral Management System to help ensure that all trades were fed into the system. Trades that failed to load are researched prior to initiating or responding to any collateral calls for the applicable agreement. Research includes, but is not limited to, reviewing the agreement setup to help ensure all trade types and counterparties are correctly coded into the Collateral Management System and requesting verification from the applicable group that trades were coded correctly in the Trust System.

The Collateral team reconciles open trades and valuations to the client’s counterparty statement. All reconciliation breaks are researched with the corresponding party. Reconciliations are performed systematically or manually on a monthly basis at minimum, with weekly and daily reconciliations performed when required by the client agreement. Reconciliations are secondarily reviewed for completeness as evidenced by approval of a daily checklist.

Daily, the Collateral Management System automatically calculates the collateral calls to be sent to counterparties by netting the client’s exposure to a particular counterparty and applying the governing rules of the agreement to determine the collateral requirement. The system then prompts the initiation of a collateral call or provides notification to expect a collateral demand from a counterparty.

The Collateral team sends collateral call notifications to counterparties. Upon agreement of the call amount by the counterparty, the Collateral team manually inputs the agreed-upon call amount in the Collateral Management System and the input is secondarily reviewed and approved.

Upon receipt of the collateral from the counterparty, the collateral movement is settled within the system. When the Collateral team receives a collateral demand from counterparty, the analyst enters the demand into the Collateral Management System. The system then automatically compares the demand amount to the collateral requirement (calculated by the Collateral Management System) to determine if the demand is reasonable. If the demand is less than the amount calculated by the system, the demand is satisfied. If the demand is more than the amount calculated by the system, the amount calculated by the system is paid to the counterparty unless the client instructs the team to satisfy the demand. A Collateral team analyst inputs the collateral demand in the applicable system, and it is secondarily reviewed for accuracy then released. The collateral instruction is sent to the applicable custodian.

On a monthly basis, the Collateral Management System calculates the interest requirement based on recorded collateral and market interest rates. The Collateral Management System generates interest demands and sends them out via e-mail. The Collateral team liaises with the client’s counterparty to arrange for settlement of the agreed interest amounts.

The Collateral team provides clients daily reports generated from the Collateral Management System, including trade extract, counterparty exposure, asset holding, and collateral settlement reports.

**CASH RECONCILEMENT**

**U.S. Cash Reconciliation**

On a daily basis, various business units perform reconciliations of operating accounts to identify transactions in suspense or that have been rejected. The suspense items and rejected transactions are identified and assigned to the appropriate area of responsibility for research. Reconciliations are prepared and reviewed in accordance with Corporate Standards. The Cash Analysis team performs a daily oversight review of the cash balances on the Trust System to the trust demand liability account on the Northern Trust general ledger. The oversight review is secondarily reviewed for accuracy. Any identified differences are assigned to the respective trust teller for research and resolution on a daily basis.

**Global Cash Reconciliation**

The Reconciliation team reconciles the Trust System cash records to those of the various subcustodians or banking correspondents. Cash positions are reconciled daily by an automated reconciliation system that compares transactions and balances reflected on subcustodian and correspondent records to the Trust System. This matching process, which contains many internal validation criteria, generates daily
reports of reconciling items. Reconciling differences are researched by the reconciler and assigned to the responsible business unit for resolution; however, only the Reconciliations team has authority to clear reconciling items. Information on reconciling items is also exported to a reconciliations management data repository.

First Line of Defense Control Business units maintain oversight of reconciliations and their aging profile and ensure key highlights are reported to senior management on a periodic basis. On a quarterly basis, exceptions are reported through the relevant Risk Committee by Business Unit Operational Risk.

SECURITIES CUSTODY AND RECONCILIATION
Custody of securities is maintained through outside depositories, subcustodians, in Northern Trust vaults, and other locations as designated by clients. Assets are maintained on the Trust System by registration codes, each identifying the location of the security. Asset holding files from the Trust System are used to prepare security reconciliations.

U.S. Securities Custody – Reconciliations to Validate
Reconciliations of securities on the Trust System to the FED and DTC depositories are performed daily through a depository reconcilement system, which reconciles securities at a transaction level and systematically assigns exception items to the applicable processing group for resolution based on transaction details. Any unmatched items that were not auto-assigned by the system are researched by the reconciler and matched where possible. The reconciler manually assigns remaining exceptions. This matching process generates daily reports that detail reconciling items. The key balancing processes and referral of reconciling items to appropriate business units for resolution are performed for DTC exceptions and FED exceptions on a daily basis by the reconcilers. Information on reconciling items is also exported to a reconciliations management data repository. Reconciling items remain on subsequent daily reports until they are resolved.

The Risk Management and Control Group reviews the status of reconciliations and aged exceptions, and highlights are reported to senior management monthly.

Subcustodian Network Management
To facilitate the safekeeping of assets in markets where Northern Trust does not have a direct relationship with a depository (current direct relationships with depositories are with Crest in the United Kingdom/Ireland, DTC and FED in the United States, Clearing and Depository Services in Canada, and Euroclear France in France), Northern Trust appoints a local bank, international bank, or transnational depository, as appropriate, in each country or investment market as requested by the clients and investment managers. These providers are referred to as subcustodians through whom global custody-related transactions are processed.

Relationships in new markets are established only after a thorough and formal review process has been completed. Northern Trust’s Network Management team works closely with the Financial Institutions & Country Risk Group who are responsible for publishing Credit and Country Risk reviews on prospective subcustodians and markets. Following an on-site visit, if possible, or remote review of the new market, the Network Manager prepares a written assessment and recommendation for submission to the Subcustodian Oversight Committee whose responsibilities include the review of securities markets in countries to be added to the network, the review of the safety and soundness of candidate subcustodians, the review of Network Management’s recommendations for additions to or changes in the subcustodian network, and the review of Network Management’s annual performance analysis of each subcustodian. The Subcustodian Oversight Committee has approval authority, with only items of material financial risk requiring further Capital Markets Credit Committee approval. After the subcustodian has been selected, a contract and service-level agreement is drafted with Legal Department review, and final agreements are signed by an authorized officer of the subcustodian and Northern Trust.

Control processes exist to provide continuous monitoring of the appointed subcustodians. Every subcustodian is subject to a formal performance review process on a defined schedule and frequency. The review examines and reports on the quality of service for relevant operating service components, benchmarked against predefined expectations. Each subcustodian is subject to a due diligence review at least annually, which generally includes an on-site visit. Items covered during the due diligence review include performance, changes to market risk profiles, and subcustodian controls. The results of performance reviews and the due diligence process are documented and reviewed by the Subcustodian Oversight Committee.

Subcustodian Reconciliations – Reconciliations to Validate
The Reconciliation team is responsible for balancing the Trust System records with those of the various subcustodians or local depository’s records for global (non-U.S.) securities. The reconciliation consists of a comparison of transactions and balances on the Trust System to transactions and balances at the subcustodian or local depository. Daily reports are generated and detail reconciling items that are researched by the reconciler and assigned to operational business units for resolution. Only the reconciliation department has the authority to close reconciling items on the automated tool. Information on reconciling items is also exported to a reconciliation
management data repository. Reconciling items remain on subsequent daily reports until they are resolved. Management information detailing the current reconciliation status and outstanding items is distributed to appropriate operational business units and managers on a periodic basis. This is augmented by the continual monitoring and escalation of items to senior management by an independent control group within Operations.

The Risk Management and Control Group reviews the status of reconciliations and aged exceptions, and highlights are reported to senior management monthly.

**Northern Trust Securities Vaults**

Northern Trust physically holds a small percentage of the total market value of securities under direct custody. Non depository-eligible trust/custody account holdings are maintained in Northern Trust securities vaults located in Chicago and London. U.S. assets may be held temporarily in the Chicago vault while they are being prepared for submission to the DTC to be held in their vault in New Jersey.

On a quarterly basis, management performs a count of physical securities maintained in the vaults by reconciling the count to the Trust System or SMAC, and identified differences are researched and resolved. Access to vault areas is controlled by a card reader, a pin card, or a key and combination lock. Only authorized individuals are allowed access. Visitors to a vault are accompanied by an authorized individual and are logged in. Access to each vault requires two separate individuals with separate parts of the combination or key/combination, which allows for dual control over access to assets. Management reviews vault access annually to help ensure it is appropriately restricted. There are specific procedures for opening vault doors as well as maintaining and changing vault locks and access. The vault or vault areas are fireproof and are further protected with security cameras, alarm systems, and/or smoke detectors.
KEY DEPOSITORIES AND SUBCUSTODIANS
As described above, Northern Trust utilizes various depositories and over 90 subcustodians across approximately 100 markets to support custody services. These depositories and subcustodians are third party vendors of Northern Trust and are not considered to be subservice organizations as defined in the relevant standards. The following table includes the depositories and subcustodian organizations utilized by Northern Trust that serve the largest number of clients in a market and have the largest holdings based on market value.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Market(s) Served</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Reserve Bank of Chicago</td>
<td>United States</td>
<td>Depository</td>
</tr>
<tr>
<td>Depository Trust Company</td>
<td>United States</td>
<td>Depository</td>
</tr>
<tr>
<td>Euroclear</td>
<td>Euroclear and Luxembourg</td>
<td>Depository and Subcustodian</td>
</tr>
<tr>
<td>HSBC</td>
<td>Australia, Bahrain, Bermuda, China, Egypt, Hong Kong, Japan, Kuwait, Lebanon, Malaysia, Mauritius, New Zealand, Oman, Palestine, Philippines, Qatar, Saudi Arabia, South Korea, Taiwan, United Arab Emirates, and Vietnam</td>
<td>Subcustodian</td>
</tr>
<tr>
<td>Deutsche Bank AG</td>
<td>Belgium, France, Germany, Italy, Spain, Turkey, and the Netherlands</td>
<td>Subcustodian</td>
</tr>
<tr>
<td>Svenska Handelsbanken AB</td>
<td>Denmark, Finland, Norway, and Sweden</td>
<td>Subcustodian</td>
</tr>
<tr>
<td>Nordea Bank</td>
<td>Denmark, Finland, and Norway</td>
<td>Subcustodian</td>
</tr>
<tr>
<td>Citibank</td>
<td>Argentina, Brazil, Bulgaria, Chile, Colombia, Cyprus, Egypt, Greece, India, Kazakhstan, Mexico, Pakistan, Panama, Peru, Romania, Russia, Slovakia, Thailand, Ukraine, Venezuela</td>
<td>Subcustodian</td>
</tr>
</tbody>
</table>
SECURITIES LENDING
Northern Trust acts as agent in the lending of securities on behalf of trust/custody clients, as well as clients with assets custodied outside of Northern Trust. Participating clients enter into a securities lending authorization agreement, which authorizes securities lending and sets out the relevant parameters, including collateral requirements. The securities are lent in various countries to borrowers, typically banks, broker-dealers, and other financial institutions that have a contractual agreement with Northern Trust for borrowing securities. Securities are loaned to the borrower in exchange for collateral in accordance with the terms of the underlying lending agreement. Participating clients determine the acceptable cash and/or noncash collateral for their program. For cash collateral, Northern Trust offers commingled fund options as well as separately managed accounts.

Using the securities lending authorization agreement, Securities lending relationship staff completes new client input sheets and forwards them to the Securities Lending Operations Group for input into the Global Securities Lending (GSL) System. To ensure instructions were properly translated onto the new client input sheets, securities lending relationship staff completes a secondary review of the input sheet prior to forwarding to the Securities Lending Operations Group. The day after Securities Lending Operations Group processes the new client setup, they review an audit trail report, which details the setup to help ensure accuracy. For new borrower setups and other client maintenance requests, an input sheet or enterprise relationship management case is communicated to the Securities Lending Operations Group.

These changes are also reviewed in the next day audit trail report by the Securities Lending Operations Group. The GSL System includes securities on loan, par value/shares outstanding, rebate rates, premiums, collateral investment earnings, and collateral values.

The appropriate credit committee approves prospective borrowers and borrower credit limits based on a counterparty review process. The GSL System does not accept or process loans for borrowers if they are not approved and active on the system. The Securities Lending Operations Group monitors borrower credit limits maintained on the GSL System using system-generated summary reports. In addition, if the borrower has reached its preapproved borrowing limit, or would exceed such a limit as a result of the new loan, the GSL System will not accept or process the loan.

The GSL System automatically and impartially allocates loans among lending clients (both custody and non-custody) who hold the assets. An exceptions report, comprising data from the GSL System and the custody systems, is utilized to identify cases where the amount of lent shares for any security per the GSL System exceeds the amount of shares in lending accounts per the Corporation's custody records. The Securities Lending Operations Group reviews these reports daily to identify if a possible exception has occurred for shares on loan. If identified, actual exceptions are reported to the proper area for correction.

For clients whose assets are held in custody with Northern Trust, Northern Trust delivers the loaned securities to the borrower and receives collateral either simultaneously or prior to delivery of loaned securities. In the case of third-party lending arrangements in which the client's assets are held by another custodian, the client's custodian delivers the securities directly to the borrower or delivers the securities via Northern Trust and also receives collateral either simultaneously or prior to delivery of the loaned securities. Northern Trust delivers the securities via Northern Trust depository or subcustodial accounts (e.g., DTC, FED, Euroclear, and Deutsche Bank). Securities Lending Operations prepares reconciliations and reviews system-generated exception reports that highlight differences related to cash and securities. The Securities Lending Operations Group researches and takes corrective action, as well as monitoring aged exceptions until they are resolved.

In a loan transaction, the borrower provides collateral in values greater than the loaned securities, as outlined in the securities lending authorization agreement. The Securities Lending Operations Group performs a mark-to-market process on a daily basis to maintain appropriate collateral levels based on loan value, collateral type, and established threshold percentages. If additional collateral is required, the borrower is obligated to provide it. The Securities Lending Operations Group prepares a daily notification by borrower that highlights borrowers that fall below collateral threshold levels. This notification is forwarded to appropriate GSL personnel, who take action as required to bring the borrower back to the appropriate collateral level. At the conclusion of a loan, the borrower returns the security to Northern Trust, who in turn returns the collateral to the borrower. Typically, fees with borrowers are determined monthly, as are client earnings, and Northern Trust's fee.

The GSL System only accepts collateral set forth in the securities lending authorization agreement. For cash collateral, Asset Management Front Office Operations Support creates an account on the portfolio management system. The Asset Management Guideline Monitoring team assigns compliance rules (restriction scheme) to the cash collateral account in accordance with the securities lending authorization agreement, which includes client-specific investment guidelines. Through the use of the Portfolio Management (PM) System Compliance Module, the Asset Management Guideline Monitoring team monitors internal and client-directed restrictions in the cash collateral accounts. The collateral is invested by Asset Management in accordance with the specified investment guidelines. The Asset Management Guideline Monitoring team reviews guideline compliance on a daily basis. The Asset
Management Guideline Monitoring team uses the PM System to inquire with the portfolio manager about exceptions. The portfolio manager response is delivered to the Asset Management Guideline Monitoring team and archived within the PM System. At least once every 12 months, the Short Duration Fixed Income team performs account reviews to monitor portfolio construction relative to the stated investment guidelines. The Asset Management Guideline Monitoring team reviews the compliance rules assigned to the account at the time of the peer review to check for consistency against the investment guidelines.

Fund Accounting calculates earnings from the cash collateral funds. On a monthly basis, total income from the investment of cash, net of borrower rebates plus the fees generated from loans against noncash collateral, are posted to the client custody accounts on the Trust System. Northern Trust's share of earnings is then charged to the respective client custody account on the Trust System. The Securities Lending Operations Group prepares a monthly income statement reconciliation, which reflects cash collateral earnings from Fund Accounting, including any monthly adjustments related to timing differences between loan activity recorded on the Fund Accounting System and the GSL System. Differences are actioned as necessary.

**BENEFIT PAYMENTS**

Benefit Payments (BP) issues both periodic and lump-sum payments to participants of trust/custody clients in defined-benefit and defined-contribution plans.

**U.S. Benefit Payments**

**Plan Conversions**

Throughout the year, BP is awarded new mandates that require the conversion of payment data from a prior trustee. Under this scenario, BP accepts data in various formats that are analyzed and converted into the standard electronic transmission format. Once converted, data is loaded as described below. After data is loaded and reconciled in a user acceptance testing environment, BP provides a letter of authorization, corresponding reports, and noted exceptions to the client for sign-off before loading data into the production environment of Northern Trust's proprietary Benefit Payment System.

**Payment and File Maintenance**

The majority of periodic payments issued by BP are recurring monthly payments directed to trust/custody clients’ plan participants. Payments are sent by paper check via U.S. mail or by electronic funds transfer (EFT). To facilitate this process, BP maintains information on the Benefit Payment System pertinent to recurring benefit payments. Information maintained includes participant identification number, home and payment mailing address, payment amount information, and deduction information, including tax withholding information.

BP receives periodic and lump-sum payment instructions from the trust/custody client or their designated recordkeeper. Instructions are received through electronic transmissions, manually via fax or mail, or through the Benefit Payment System. The majority of payment requests are received through electronic transmissions and are transmitted directly into the Benefit Payment System. Transmission interfaces with a client and/or recordkeeper are assigned a unique client record number and password at the time of setup and are verified upon receipt. The payment requests received through the electronic transmission file will first have a total record that agrees with the number of transactions submitted in a file. Once this first step is confirmed, the file is loaded into the Benefit Payment System, where a client or recordkeeper is required to verify that the total expected payments agree with their totals. If the payments agree, the client or recordkeeper must approve the file and then it is processed. If the file does not reconcile to the external user’s totals, the external user may delete the file and stop it from processing. Clients are responsible for resolving the exceptions through usage of system front-end user controls.

Upon receipt, BP confirms the manual instructions are from client-authorized parties by comparing the instruction to client-approved authorization lists. High-dollar payment instructions are also authenticated via callback to an authorized approver on a recorded phone line. The payment instructions are then manually input into the Benefit Payment System and independently approved as required by systematic controls within the Benefit Payment System. The instructions are executed by the Benefit Payment System during a nightly production job and payments are produced the following business day.

Trust/custody clients may also input payment instructions directly into the Benefit Payment System, which clients may access via an Internet browser. The Benefit Payment System Web application requires the user to reconcile the payment as the input is being performed by ensuring that both sources and taxation of payments are equal.

BP also receives instructions manually from client, recordkeeper, or payment recipients for file maintenance/change requests (e.g., EFT/ACH, address, name, etc.). Upon receipt, BP staff review the request for change to validate it is from an authorized party, and then the change is input in the Benefit Payment System. For financial changes (e.g., payment and EFT changes or adjustments), the system requires an independent approval by a second person prior to processing. The printing of daily and monthly payments (i.e., checks and EFT advices) is completed by a third-party vendor. Although actual check production is performed by the vendor, BP performs balancing and control procedures during the payment process. BP preassigns the check numbers required for check payment production and sends them in a file, via secured lines, to the vendor for check payment creation.
When the vendor receives this file, they conduct a preliminary field total verification procedure and in return send BP a “point-to-point” file verification.

BP sends to trust/custody clients a monthly report of checks issued to plan participants that have been outstanding for greater than 60 days, as a tool for clients to use in detecting unreported participant deaths or nonreceipt of payments by participants.

**Tax Withholding and Reporting Process**

The Benefit Payment System withholds federal, FICA, state, local, and Nonresident Alien (NRA) taxes from payments issued, and BP uses a tax application to record/track taxes withheld from client accounts and to remit the taxes to the appropriate government agency within the required time frame. BP pays withheld federal, FICA, and NRA taxes to the Internal Revenue Service (IRS) daily, while state and local tax withholdings are paid according to the individual governmental entities’ requirements. BP reconciles taxes paid to the tax application on a daily basis, and state and federal taxes recorded on the tax application are reconciled to the Benefit Payment System on a monthly basis. Discrepancies identified from these reconciliations are researched and resolved.

**Control Processes**

A daily report detailing activity in the Trust System (including activities in internal accounts used for tracking outstanding checks, federal/state tax withholdings, etc.) is reconciled to Benefit Payment System and the status of each account is produced and reviewed by BP. BP reconciles these internal accounts daily and the reconciliations are secondarily reviewed for accuracy. The BP Balancing and Control unit reviews the exceptions related to the reconciliation of the Trust System to the Benefit Payment System through two exception reports. The first report identifies trust transactions that do not have a coinciding benefit-payment transaction. These items are generated when a department outside of BP categorizes their transaction as a benefit payment transaction and are corrected by recoding the item with the appropriate transaction code, tax code, or trust number. The second report identifies those items processed on the Benefit Payment System, which did not generate a coinciding transaction on the Trust System. In some cases, cash transactions should not be generated and the items are marked as such on the physical report. In cases where cash transactions should have been generated, a manual transaction is processed to correct the out-of-balance condition.

**Canadian Benefit Payments**

The Canada Benefit Payment process follows the same control processes documented for U.S. Benefit Payments, with the following differences:

**Payment and File Maintenance**

The printing of payments and the distribution of direct deposits and their advice is completed by Scotia Bank, acting as paying agent for Canada BP. Payment instructions may also be received manually from trust/custody clients on a standardized paper form or a client letter of direction for Canadian clients. High-dollar payment instructions are also authenticated via callback to an authorized approver.

**Tax Withholding and Reporting Process**

The Benefit Payment System withholds the appropriate Canadian taxes for each payment processed and stores a weekly schedule for Canadian withholding, with the exception of NRA withholding, which falls into a monthly cycle. Utilizing these withholding schedules, the Benefit Payment System retrieves appropriate pending withholding “transactions” and releases a report detailing how much money should be transferred out of the Scotia Bank checking account and remitted to the appropriate government agencies. These transfers are managed through transactions initiated in Scotia Bank's Web tax filing system. Upon receipt of the tax statement from the various government entities, Canada BP reconciles the taxes withheld from the participant payments on the Benefit Payment System to taxes remitted to the various government entities.

**Control Processes**

Canadian benefit payments are drawn on a checking account established with Scotia Bank. Canada BP funds the Scotia Bank account by client accounts via wire transfer. The wire transfer request is originated by the transactions processed via Benefit Payment System. Through a nightly batch process, the funding requirements are interfaced to the Cash Movement System. On a daily basis, the Canada BP manager or a senior BP consultant reviews and approves the cash movement transaction, which then generates the appropriate wire transfer to Scotia Bank to cover the new payment activity. The BP team reconciles the Scotia Bank account, the Trust System, and the Benefit Payment System on a monthly basis. Differences are researched and resolved and the reconciliation is secondarily reviewed for accuracy.

**ASSET CODING**

The Asset Coding team is responsible for the security master file. The security master file contains assets that are actively held (active) as well as assets that are pending activation (vendor). Both industry-established and Northern Trust specific identifiers are assigned to each active security. Asset details are provided and refreshed from automated feeds by multiple industry-leading data vendors, as well as by manual processes.

Coding of derivative assets follows the same process as defined in this section, except different vendors are utilized for derivatives setup details.
Asset Coding moves assets from a “vendor” to an “active” status in order for transactions to settle or transition processes to complete. Assets are made active through automation or manual intervention based on requests received from various security receiving areas.

The various security receiving areas, such as Trade Processing and Transition Services, provide basic asset information to Asset Coding in order to complete the manual activation of the asset to facilitate setup of the asset. Asset Coding may also research various vendor sites to obtain additional information for asset setups. For nonmarketable investments and derivative assets that are manually coded, Asset Coding receives information from various security receiving areas, as well as outside vendors, physical certificates, fund families, etc. The information obtained is manually entered by an Asset Coding analyst into the security master file, which prompts for missing information from critical fields essential for asset setup and does not allow for activation of the asset until such fields are populated. Securities that are manually coded, including modifications to existing assets, are independently reviewed daily, if necessary, dictated by the business unit procedure.

The automated setup process allows new trades to be processed even though the asset may not be “active” within the master database. A new trade scans the security master database for a match based on the asset identifier used in the transaction. If the identifier is found in the “active” asset file, the existing Northern Trust identifier is attached to the transaction, and asset setup is processed straight through. If the identifier is found but is not “active,” the Asset Coding System activates the asset if all critical fields are present and assigns a new Northern Trust identifier, allowing the transaction to process straight through. If not all required fields are present, an Asset Coding analyst manually updates the required fields prior to the asset becoming “active.” Manual updates are secondarily reviewed by an independent individual, if necessary, dictated by the business unit procedure, to ensure accuracy of input. Nonmarketable investments and derivative assets coded automatically via the autocoding function. Derivative assets receive information directly from the Derivatives Trade Capture System.

To help ensure complete and accurate asset records, the security master file performs various checks on the asset records based upon pre-determined criteria embedded in the system and external tools. Asset details that do not meet these predetermined criteria are identified as exceptions to be researched. These exceptions are generated throughout the day and Asset Coding analysts research and resolve exception items. A partner challenge process is also in place that allows internal partners to challenge the setup or the specific data points related to any asset contained in the database. Any challenge received is researched and resolved in a timely manner.

**ASSET VALUATION**

The Pricing Department is responsible for receiving security prices from authorized sources and applying those prices to the security. The Enterprise Pricing Committee is charged with acting as the governance body for pricing and approves the Pricing Guidelines utilized by the Pricing Department. These investments may be held in custody, fund accounting, investment operations outsourcing, or daily valuation accounts and may include stocks, fixed income, funds, or derivatives. Pricing also processes prices received from other areas of Northern Trust for sundry securities, such as real estate and some insurance contracts and limited partnerships.

Valuation of derivative securities follows the same process as defined in this section, except different sources are utilized for derivatives prices.

The majority of securities are automatically priced from data received via electronic transmissions from authorized external pricing vendors, which are approved by the Enterprise Pricing Committee. Vendors are monitored for performance and graded on a monthly scorecard. The remaining securities are priced by Pricing personnel through manually obtaining prices from a variety of internal and external sources. Prices manually entered into the Pricing System are systematically required to be secondarily reviewed for accuracy prior to upload into the system. The pricing frequency of the securities is determined by market convention. New securities are monitored by Pricing personnel throughout the day and researched to determine their appropriate price from an approved pricing source.

The Pricing System assigns prices based on defined parameters at established times throughout the day. Changes to the system parameters follow a defined protocol and are restricted to authorized control team members. Exceptions are created for prices that fall outside the defined parameters or for securities that are missing prices. These exceptions are researched and resolved by Pricing personnel.

Control reports are generated, which highlight unpriced, stale priced, and securities that have large percentage movements and these exceptions are reviewed, researched, and resolved by Pricing personnel.

Challenges regarding the reasonableness of prices may be received from clients, other partner areas, or investment managers. Challenges are researched through independent pricing vendors or other sources and prices are changed in the Pricing System, if deemed appropriate. Any manual change required is secondarily reviewed for accuracy.

For certain securities, like hedge funds and commingled funds, the Alternative Fund Services team obtains prices from third-party fund statements and manually inputs the prices into the alternative assets platform. An individual
independent of the input reviews it for accuracy as part of the month-end fund statement audit process. Any identified differences are researched and resolved by an analyst, and the updated values are systematically fed to the Trust System. For limited partnerships, market values are updated based on partnership valuation statements and are adjusted based on cash flows. The values for limited partnerships are reviewed by the Private Equity team and systematically sent to the Trust System upon completion of the review. OTC Derivative contracts are generally independently priced through the use of an external Derivative pricing vendor. For OTC Derivative Contracts that cannot be independently priced, or the client elects to use a different pricing source, it may be necessary to use prices supplied by the client, their fund manager, or their counterparty. These prices are captured automatically where possible. Where this is not possible, prices are manually entered into the Pricing System and secondarily reviewed for accuracy.

CORPORATE ACTIONS
Corporate Actions is responsible for monitoring the announcement of corporate action events and notifying holders when such events affect assets held in client accounts.

Details of corporate action announcements are received daily from outside vendors, subcustodians, and registrars (for United Kingdom assets) and recorded on the Corporate Actions System. On a daily basis, processors review incoming announcements to determine whether the announcement is new, duplicated, or revised. Differences between sources are researched and resolved. Once announcements are recorded on the Corporate Actions System, notifications are generated for holders of the securities affected by the corporate action. For voluntary corporate actions, the notification also contains a request for instruction from the client/fund manager to be returned by a specific date. Prior to notification, announcements and requests for instructions are independently reviewed for accuracy. Upon approval, these announcements are delivered to clients, fund managers, and internal business units (with client representation) by the Corporate Actions System via Passport, SWIFT messages, or fax.

The Corporate Actions System is used as the central repository for client, fund manager, and internal business unit instructions. For voluntary events, a control sheet within the Corporate Actions System lists clients involved in an event. As each instruction is received, the decision is noted on the control sheet. The majority of decision sheets are submitted online by the client or their delegated third party. For decisions received that require manual input (i.e., faxes) to the Corporate Actions System, a systemic independent review is enforced to help ensure accurate input of the decision. This review requires certain key fields to be reinput and matched accordingly. The Corporate Actions System also requires a third level of approval in high-risk (e.g., greater than $50 million market value of parent asset) events to ensure every stage of the life cycle from announcement to pay date is controlled under six eye checks. Missing decisions are pursued with escalation to both the authorized decision maker on the clients’ account and Corporate Actions management. There may be occasions where no instruction has been received by the deadline for corporate actions, and Corporate Actions management will review the circumstances and will elect the market default. Once decisions have been collated, instructions are sent to the relevant depository, subcustodian, or registrar (for United Kingdom assets) by the event’s deadline. The instructions are independently reviewed for accuracy and completeness prior to sending. For markets where client accounts are held with a subcustodian, the service level agreement states that the subcustodians perform follow-up procedures in the event of nonreceipt of instruction from Northern Trust.

For mandatory actions, such as stock splits, the Trust System and the reporting and valuation systems are updated from the vendor/subcustodian announcements to help ensure that subsequent activity regarding the affected security, such as security valuation and income payments, are accurately reflected.

Entitlements received from the depositories and paying agents are deposited into a clearing account and reviewed to help ensure that the entitlement received is as expected. Processors post the cash or shares to client accounts on the Trust System. After the corporate action transaction is posted, the clearing account is reconciled to the Trust System to help ensure entitlements have been posted. Discrepancies are identified, investigated, and resolved. A report of outstanding exceptions is prepared and reviewed by management.

An event is closed and archived when action dates have passed, appropriate actions have been taken, and shares are moved to in-custody status and/or appropriate cash entries have been made.

INCOME COLLECTIONS
Income Collections is responsible for recording, processing, and collecting dividends and interest due on assets held in client accounts.

Prior to security payable date, dividend and interest data are received directly via automated interfaces from independent vendors, including depositories. Upon receipt of a vendor announcement, an accrual is set up in client accounts holding the assets as of the date that establishes the entitlement. An “income map” with entitlement data (pay date, record date, ex-date, rate, etc.) is produced by the Trust System that represents a summary of income expected to be received by client accounts holding the relevant securities in custody on the payable date. On or before payable date, Income Collections receives various types of income pre-advices from subcustodians, paying companies, and custodians. The pre-advices are compared
with the income maps in the Trust System via match reports to determine the correct amount of income to be received. Unmatched items appear on various exception reports and are researched and resolved via adjustments on or before payable date.

For contractual markets, income is reconciled and automatically posted to client accounts on expected payment date, even if the payment received from the agent is not an exact match to the income map. Any discrepancy is investigated and corrected action is taken as necessary. For noncontractual markets, income is automatically posted to client accounts upon receipt of funds if the payment received is an exact match to the income map. Income received, which is not an exact match to an income map and did not automatically post to a client account, is identified via a control report and the income is then manually input in the Trust System. The input is secondarily reviewed and released and posted to the client accounts.

Income Collections is notified by depositaries, subcustodians, and custodians of income payment details, including the tax withholdings for the payments. Income is received into internal processing accounts prior to allocation to client accounts. Post payable date, income received is reconciled to income paid. Reconciling items are reflected on control reports and the items are researched and resolved via adjustments, if necessary. Open items are reported to management weekly.

TAX WITHHOLDING AND RECLAMATION

International Tax Services (ITS) reclaims tax withheld on dividends and interest in markets where tax reclaim benefits are available to clients. This group also seeks to obtain tax benefits/exemptions for clients (relief at source). ITS helps to ensure necessary documentation is requested from the client at the time a new relationship commences and also manages the renewal of documentation that is close to expiring to support relief at source or reclaim opportunities.

When Income Collections posts interest income and dividends, the Trust System performs an automatic analysis of that posting and generates a recoverable amount where appropriate. The recoverable amount is determined by cross-referencing the withholding tax rates applicable to the country in which the income originated against data in the client’s tax matrix. The Tax Group sets up the tax matrices on the Trust System, which are specific either to an individual client or to client type. The matrices reflect a client’s complete set of tax entitlements on a worldwide basis. As tax situations in different countries change, the matrix is updated accordingly. The withholding tax rates to which the tax matrices are compared are obtained from independent sources (e.g., external accounting firms, subcustodians, and governing authority bodies).

Tax receivables are recorded in reclaim databases or the Tax Manager System for American Depository Receipts (ADR), and they are detailed at individual client portfolio/dividend level for each country. Each staff member in the reclaim unit is assigned a country or set of countries for which they claim recoverable taxes relating to their particular jurisdiction. The standard reclaim frequency differs from market to market, but the objective is to raise the reclaim as soon as possible, conditional upon the underlying market being able to support such frequency of claims. A process is in place to review receivables that remain unclaimed past the stated claim frequency. Reclaims are assigned a status, which is utilized to generate management reporting, including dashboards to monitor the progress of receivables. Additionally, Management performs a regular review of outstanding receivables, including discussions with clients and relationship management as necessary.

Tax reclaim documentation is prepared by Northern Trust and is given directly to the relevant tax authority or, in the majority of markets, the appointed subcustodian for onward transmission to the local tax authorities. This process may require tax certification to be obtained by the client from their own tax authorities before claims can be submitted. Northern Trust uses an industry utility to file ADR tax reclaims. Depending on the dividend, the reclaim and supporting documentation is sent to the U.S. agent bank or the underlying country’s tax authority. Where possible, relief at source will be obtained directly through DTC dependent on market and issue. Northern Trust will identify the appropriate tax rates utilizing the DTC to enable the receipt of the most favorable tax rate available on dividend payment date. Once reclaims have been settled by the tax authorities of the countries involved, funds are identified and posted to client accounts promptly after the receipt of an appropriate notification from the relevant tax authority/subcustodian.

Supervisors regularly monitor key elements of the tax reclaim operation: items that should have been claimed according to Northern Trust standards but have not been, items that have been claimed that are considered overdue, and items that are approaching expiry of statute of limitations. Management performs a regular review of reclaimable amounts, including a review of trends and recent market developments in order to mitigate developing risks and to help ensure service levels are maintained. Additionally, a review of business as usual metrics is performed and dashboard reporting is produced.

NONRESIDENT ALIEN TAX WITHHOLDING

The Nonresident Alien (NRA) tax function is responsible for documentation, withholding, and reporting on U.S. source income paid to custody clients that are NRAs or foreign legal entities. New client setups are reviewed daily by a tax technician for foreign status. The tax technician is responsible for identifying foreign clients from the new account take on form, requesting a W-8 form (form to be completed, which grants a non-U.S. party an exemption
from certain U.S. tax reporting and withholding), and linking the accounts to an internal bank identification number. Upon receipt, the W-8 form is validated using the MD3 software validation tool. The validation results set the parameters used by the withholding module, including the expiry dates of all W-8 forms.

When a foreign custody client’s account is credited with U.S. source dividend or interest income, the Trust System extracts information from the withholding module for a withholding tax rate. The tax rate is determined on the basis of the type of income and the parameters set for the client in the validation process. The withholding rate is then used to create an entry in the Trust System to debit the client’s account for the withholding tax.

The withholding tax for each client and income event is credited to an internal escrow account, and the balance of the account is electronically deposited with the U.S. Treasury on a quarter-monthly deposit schedule. On an annual basis, the withholdings in each client’s account are reconciled to the withholdings in the internal escrow account. The withholdings in the internal escrow account are then reconciled to the transcript of the tax deposits made to the U.S. Treasury. Differences are researched and tracked until they are resolved.

**CLIENT ACCOUNTING AND REPORTING**

The Client Valuation Reporting functions are organized to support the periodic trust/custody reporting needs of clients. Client reporting is produced on a schedule that is agreed upon with the client. Information on asset pricing, holdings, transactions, cash, and accruals utilized to prepare the reporting is generated from the Institutional Investor Passport (IIP) System and provided to clients via the IIP System. Market activity and standing asset data are input and maintained by various operational departments within Northern Trust. As agreed upon with clients, prior to delivery of reporting to the client, the valuation data is analyzed to help ensure accuracy. Analysts use checklists to complete the analytical review, as well as customized client-specific processes where applicable. The checklists list the key processes required to help ensure the client statements are reviewed for accuracy and completeness.

Periodic accounting reports are generated from IIP and are reviewed utilizing Web-based exception tools. IIP information is reviewed to validate that data is flowing to the client reports as expected, and Web-based exception tools highlight instances where data falls outside of set parameters. Additional checks identify compliance with relevant accounting standards and guidelines. Identified exceptions are routed to the originating business unit for clarification and resolution. In certain instances, corrections may be applied to tax cost, market values, or month-end accruals and reporting dates. Upon correction of necessary exceptions and completion of the analytical review, analysts approve the final data for release to the client. Reviewed reporting is then made available to the client.

In addition to the periodic accounting reporting that is standard for all clients, Client Valuation Reporting provides Allocation and/or Unitization reporting to clients subscribing to this type of ancillary reporting. Allocation and Unitization reporting apportion the assets and activities of a master trust to the individual plans or participants with an interest in the trust.

For Unitization clients, fund values and transactions are automatically loaded into the Units and Plan Valuation Tool (UPT) from the Trust System. Once the information has been added to the UPT, the transactions are reconciled to transactions provided by Client Servicing, and identified differences are researched and resolved. The accounting analyst then filters relevant data through reporting templates on the IIP system and reviews the unitization reporting package utilizing a unitization checklist to help ensure the reporting is accurate. The unitization reporting is then secondarily reviewed.

For Allocation clients, the UPT automatically extracts standard transactions and market values from the Trust System. Analysts verify that the transactions are related appropriately to the plan and reconcile to the Institutional IIP System. The analyst creates the reporting from the IIP System and reviews the reporting utilizing an allocation checklist to ensure the reporting is accurate. The allocation reporting is then secondarily reviewed.

As an added measure, the Quality Assurance (QA) team randomly reviews a selection of analysts’ work. The QA team is an independent function within the Client Valuation Reporting groups. The QA team performs an “after-the-fact” review of periodic work to verify that policies and procedures have been properly documented when performing the analysis of the various types of reports. Any omissions of standard audit checks are reported to the analyst and their manager for review.

Manager Sign-off Reconciliation is an additional service provided to clients upon request that allows for an additional level of review over client reports. The Reconciliations team reviews variances between Northern Trust’s account data and that of the investment manager at a portfolio level. The reconciliation is performed by the investment manager and submitted to Northern Trust. The noted variances are compared to reports generated from IIP to validate the variances against client-specified parameters related to positions, prices, accruals, and net asset value (NAV) tolerances (limits in basis points) established for each client account. The Reconciliations team sends the variances outside of the specified parameters and tolerances to the originating business unit for review and correction, if necessary.
After resolving variances as necessary, the Reconciliations team signs off on accounts within the client-agreed tolerances per client-agreed-upon deadlines. If the overall portfolio value discrepancy is still outside the client-agreed tolerance and the Northern Trust account data was confirmed to be accurate, the Reconciliations team signs off on the account and includes the rationale for the remaining discrepancy in the sign-off e-mail.

**INVESTMENT RISK AND ANALYTICAL SERVICES**

**Performance Reporting**
The Investment Risk and Analytical Services (IRAS) Performance team is organized to support the performance reporting needs of clients. Reporting for client accounts is produced on a timeline that is agreed with the client (i.e., daily, monthly). Client Accounting and Reporting reviews the portfolio data (see Client Accounting and Reporting narrative) and sends a confirmation to the Performance team upon completion. IRAS Performance Analysts then complete an analytical review of the data, prior to delivery of the performance reporting, utilizing client-specific procedures, and/or checklists. Items noted during the review that require additional research are routed to the appropriate business unit, who either confirms the issues raised or directs the IRAS Performance Analyst to rerun the performance data to reflect adjustments processed. The performance reviews are focused on the reasonability of the returns based on the client’s investment strategy, market conditions for the period being reviewed, benchmark returns for the period being reviewed, and client activity. Portfolios that reflect significant cash flows in or out of accounts may require additional measures to properly reflect those events in the rate of return calculation for the specific portfolio. The rates of return calculation methodologies utilized are consistent with industry standards, such as the Chartered Financial Analyst Institute’s Global Investment Performance Standards (GIPS) and Banking Administration Institute (BAI) standards.

Once the reviews are completed, the IRAS Performance Analyst finalizes the performance valuations, and generates the performance reporting. Reporting is typically set up to client specifications and delivered to clients via their preferred method of delivery.

**Private Monitor**
The IRAS Private Monitor Service is designed to support the periodic performance reporting needs of clients who are private market asset investors. Prior to report delivery, the Private Monitor team performs a review of the information after Client Accounting and Reporting reviews the portfolio data (see Client Accounting and Reporting narrative) and sends a confirmation to the Private Monitor team. Private Monitor analysts then complete an analytical review of the data, prior to delivery of the reports, utilizing client-specific procedures and/or checklists. Items noted during the review that require additional research are routed to the appropriate business unit, which either confirms the issues raised or directs the Private Monitor Analyst to rerun the performance data to reflect adjustments processed. The Private Monitor Service reviews are focused on the reasonability of the performance returns based on the client’s investment strategy and market conditions, benchmark returns, and client activity in the accounts for the period under review.

Once the reviews are complete, a Private Monitor analyst signs off on the report data and notifies a Private Monitor consultant to begin the process of generating Private Monitor client performance reporting. Once client reports are finished, but prior to delivery to the client, each report is reviewed for reasonableness and completeness and signed off by an independent Private Monitor consultant.

**Compliance Monitoring**
The IRAS Compliance Monitoring Service is designed to provide clients with two support levels for their investment guideline implementations and the ongoing maintenance of the guidelines. The IRAS Compliance Consultant sets up and provides ongoing maintenance of the client’s investment guidelines in the Compliance Analyst System. After the investment guidelines have been input into the system, test guidelines are processed to determine if the guidelines have been set up accurately and to help ensure violation notifications appear as expected. The IRAS Compliance Consultant reviews the test guideline output with the client and makes any necessary changes to the guideline setup prior to the account going live on the system. The IRAS Compliance Analyst System generates investment guideline violation exception reports, and the reports are provided to the client for review and resolution.

**Market Risk Reporting**
The IRAS Market Risk Service is designed to provide clients with a variety of services to facilitate their market risk management decisions. Northern Trust utilizes several different risk systems, depending on the client need. The IRAS Risk Consultant manages the client onboarding process and a member of the Risk Product team verifies the technical setup is complete and correct. Once live, the IRAS Risk Consultant completes a review of any data reconciliations and subsequent risk analytics prepared on a periodic basis. The review focuses on changes in the risk figures compared to previous periods and market conditions. Items noted during the review that require additional research are investigated by the IRAS Risk Consultant and revised data is requested from the relevant business unit where necessary. Each task in the production of client deliverables is secondarily reviewed. Reports are provided to the client securely via Passport or using an encryption method.

**UNITIZED VALUATION AND REPORTING SERVICES**

Unitized Valuation and Reporting Services (UVRS) is responsible for the daily valuation and support of clients’ retirement plans from a trustee/custodian perspective and
UVRS consists of two departments. UVRS Servicing interfaces with clients and their recordkeepers on plan changes, participant transactions, and other trading support. UVRS Accounting performs NAV calculations, reviews exception reports between the Trust System and the Fund Accounting System, balances participant units to the recordkeeper, and provides reporting to the client, auditor, recordkeeper, or investment manager.

UVRS receives participant-directed information via electronic transmission each evening from clients' recordkeepers. The transmissions post overnight to the Fund Accounting System, along with approved transactions that are received from the Trust System. The following morning, UVRS Accounting performs a quality check of the electronic data transmissions. Identified exceptions are routed to the originating business unit for clarification and resolution.

Transactions and positions (including participant units, income accruals and payments, expense accruals, realized gain/loss, and settlement transactions) are automatically reconciled between the Trust System and Fund Accounting System daily, generating exception reports. UVRS Accounting analysts review the exception reports and research and resolve the items.

Northern Trust’s Pricing Department collects security prices, which are automatically sent to the Fund Accounting System from the Pricing System. UVRS Accounting analysts review and research price comparisons, stale prices, and prices outside of specified tolerances prior to the valuation process. Price variances exceeding established thresholds are resolved.

The Fund Accounting System automatically calculates the NAV. After the NAV is calculated, an electronic NAV calculation package is generated to support the calculation, which includes cash, holdings, and participant share/unit/equity reconciliations, expense calculations, etc. A UVRS Accounting analyst reviews the NAV calculation for accuracy, utilizing a NAV checklist and the documentation within the NAV calculation package. The NAV calculation is also secondarily reviewed, evidenced via the online NAV Status Report. Detailed portfolio holdings, transactions, and NAV information are made available online to clients, recordkeepers, and investment Managers.

**FUND ACCOUNTING**

Fund Accounting is responsible for maintaining the books of record for investment company products, including both Northern Trust proprietary funds and third-party clients. Fund products supported include pooled investment vehicles (e.g., mutual funds, Undertakings for Collective Investment in Transferable Securities, and common and collective trust funds), business and group trusts, hedge funds, partnerships, pension funds, funds of funds, Exchange Traded Funds and Liquidity Funds. Fund Accounting serves as the official book of records for the funds they administer.

Fund Accounting validates the components of the net asset value (NAV) utilizing reconciliation tools and reviewing exceptions generated by the Exception Management System (EMS) or other exception tools where applicable. The NAV includes capital stock, investment transactions, income and expense accruals, and security valuations.

Fund Accounting reconciles cash, security positions, and investor activity held on the Fund Accounting System to the positions reported by the custodian, transfer agent, and third parties where applicable. Exceptions are researched and resolved.

Investment transactions are sourced from internal applications or are received directly from the investment manager, and they are posted to the Fund Accounting System.

Fund Accounting corporate action specialists help ensure mandatory and voluntary corporate actions are reflected on the Fund Accounting System. Voluntary corporate actions are reflected on the Fund Accounting System once the client’s course of action has been advised. Fund Accounting also reviews NAVs impacting corporate-action-related exceptions identified through EMS or other reconciliation tools. The exceptions are researched and resolved.

Fund Accounting reviews and resolves income, and expense accrual variances identified by EMS or reconciliations.

Security prices are validated by Northern Trust’s Pricing Department. Pricing exceptions that impact the NAV are identified through EMS for vendor prices or other tools. Fund Accounting researches the exceptions to help ensure the prices are valid.

The Fund Accounting System automatically calculates the NAV. Evidence of fund accounting activities that support the NAV calculation are maintained in valuation packets (excluding corporate actions, which are maintained in an online repository). The packet includes a checklist that outlines the documentation reviewed to complete the valuation. Fund Accounting completes each step on the checklist prior to secondary review of the valuation packet for accuracy and completeness.

After the valuation is completed, final NAVs are disseminated to interested parties, which include stock exchanges, transfer agents, recordkeeper, and clients.
TRANSFER AGENCY

Northern Trust acts as the Transfer Agent for partnership, mutual fund, and commingled fund products in the United States and for unitized funds in Ireland, the United Kingdom, Guernsey, and Luxembourg. The Transfer Agency Department/Agent is responsible for processing investor transactions (including processing cash receipts and payments), issuing investor statements, maintaining the register of shareholders/unitholders and for paying income to shareholders/unitholders on the Share Registration System. When an initial investment is made, investor details are set up on the system and subsequent amendments are subject to independent review.

The Transfer Agency Department/Agent receives investment and redemption requests from the investor or the investor’s authorized party. Investment and redemption transactions take place at times specified in the appropriate fund prospectus or documents. The funds, as set forth in the fund prospectus or documents are valued by Fund Accounting. The calculated NAVs are automatically loaded in the United States or uploaded/entered by the Transfer Agency Department in Ireland, United Kingdom, Guernsey, and Luxembourg. For Partnership Investor Servicing in the United States, capital balances are loaded by the Partnership Investor Servicing team. Hedge Fund Investor Servicing Administration in Ireland is similar to that of Ireland’s unitized funds.

Transaction instructions from investors may be received by fax, mail, e-mail, telephone (which are taken via recorded lines at Northern Trust), or electronic transmission (e.g., straight-through processing, File Transfer Protocol, and Internet). For telephone transactions, Transfer Agency staff validates caller identity through the use of security questions and verifies that the transaction is permitted to be initiated via telephone. Transactions are read back to the caller for validation and quality control. For telephone transactions, validity of these instructions, with the exception of straight-through processing, are checked and reviewed by an analyst prior to entering the transactions on the Share Registration System. Once transactions are entered, a second analyst will review and validate the entered transactions on the Share Registration System. The analyst signs off on each share registry transaction to evidence their review. Prior to executing a transaction, the Share Registration System automatically checks the remaining unit/capital balance to help ensure that more units/capital is not sold than is owned. In the United States and London, a late trade report is generated and reviewed by management to help ensure valuation at the appropriate point in time based on established cutoff rules. In all other locations, systematic controls alert the user when attempting to process trades requested after cutoff times.

A cash flow/capital activity report (reflecting estimates of cash in and cash out based on the previous NAV per unit and previous capital balances for each relevant fund) is produced by the system/analyst and distributed to the relevant investment manager and/or trustee/depository where appropriate. The NAV per unit/net capital balance for each fund is received from Fund Accounting and is uploaded/entered into the Share Registration System. The share/unit register for each fund is updated pursuant to the investment transactions. Trade correction requests are input into the Share Registration System by a Transfer Agency analyst. The completed transaction, including gain/loss impact, is then secondarily reviewed.

A Transfer Agency analyst reviews share register update requests for client authorization and inputs them into the Share Registration System. Requests are then secondarily reviewed for accuracy and completeness. In the United States, certain share register updates may be requested via telephone. Share register updates accepted by telephone are received on recorded telephone lines. A Transfer Agency staff member will validate the caller’s identity through the use of security questions and verifies that the share register update is permitted to be initiated. Share register updates are read back to the caller for validation and quality control.

Transaction confirmation data/client statements are generated using data from the system, and an external vendor may be engaged to create the statements for clients and unit holders, where applicable. In Ireland, the United Kingdom, and the United States, the transfer agent performs a review on a sample basis of daily confirmations and periodic statements to confirm accuracy. The data is then circulated to the client and unit holders, or on occasion, to an external vendor. Investors also receive a confirmation when an address change is made on the Share Registration System for certain types of funds.

Fund Accounting provides pricing files with fund NAVs. These files are then uploaded to the Share Registration System. Transfer Agency Department manually loads pricing to the Share Registration System for a minimal amount of prices and distribution factors in London, Ireland, Guernsey, Luxembourg, and the United States.

PRIVATE EQUITY FUND ADMINISTRATION

Private Equity Fund Administration (PEFA) provides both Northern Trust and third-party clients with comprehensive administration, financial reporting, and investor reporting services for their funds and related entities. Fund products and strategies supported include buy-out, mezzanine, secondaries, fund of funds, communications, sustainability, distressed debt, and turnarounds. Services include assistance with fund establishment and structuring, investment and divestment execution, investor drawdowns and distributions, financial reporting, and assistance with investor tax reporting. These services are supported by the Private Equity System and controlled using checklists, reconciliations, and audit exception reports.
The Private Equity System incorporates portfolio management, accounting, investor relationship management, and investor reporting module with notifications to clients utilizing facsimile and e-mail functionality. Customized calculations are coded into the Private Equity System in accordance with the fund's principal documents. A banking interface facilitates the automatic processing of investors calls and distributions between the Private Equity System and bank accounts held with Northern Trust.

As part of each fund closing, PEFA receives completed subscription documentation from the investor either directly, via a legal representative, or from the client. This documentation is reviewed to confirm the investor data (such as investor name, investment amount, investor contacts, and investor bank details), which is then input onto the Private Equity System. If the investor data is incomplete, PEFA will liaise with the relevant party to obtain the outstanding data. Once the data has been input, this is subject to secondary review for completeness and accuracy.

Investor calls and distributions and investment and divestment transactions are input onto the Private Equity System upon receipt of a recommendation or request from the investment advisor/client or other duly authorized party (recommendations from the investment advisor are subject to approval by the directors of the fund or general partner [manager]). This is validated by PEFA in accordance with the client-authorized signatory list prior to processing. These processes are controlled using checklists or alternate controls that are subject to secondary review for accuracy.

Expense instructions that have been approved by the investment advisor/client or other duly authorized party are validated by PEFA in accordance with the client-authorized signatory list prior to processing. The expense is input onto the Private Equity System and the Cash Movement System. Input onto the Private Equity System is subject to secondary review, and input onto the Cash Movement System is subject to secondary review(s) in accordance with the internal-authorized signatory list prior to release.

Cash and investment reconciliations are completed by PEFA on a monthly and quarterly basis, respectively. Cash reconciliations are completed between the cash balances recorded onto the Private Equity System and the fund's bank statements. Investment reconciliations are completed between the investments recorded onto the Private Equity System and the client or the fund's investment advisor, broker(s), custodian(s), or underlying fund manager's records. These reconciliations are subject to secondary review for completeness and accuracy. Unreconciled items are investigated and resolved and incomplete reconciliations are escalated to management.

Financial statements are prepared by PEFA in accordance with the principal documents and are based on underlying financial transactions, such as income, expenses, gains/losses, and investment activity, which are input onto the Private Equity System. Valuations of the fund's investments are received from the investment advisor/client, broker, custodian, or underlying fund manager and input onto the Private Equity System, which are subject to secondary review for accuracy. During the production of the audited financial statements, PEFA will liaise with the auditors and provide all supporting information to them and these statements will receive an opinion from the independent auditor.

PEFA assists with tax reporting by providing accounting and investor information from the Private Equity System to the investment advisor/client and/or third-party tax reporting consultants for evaluation, formulation, and subsequent reporting in order to fulfill the fund's statutory and regulatory tax-filing obligations. Investor copies of such documents may also be distributed to investors by PEFA.

**INVESTMENT OPERATIONS OUTSOURCING**

Investment operations outsourcing is a service for clients who are investment managers and is designed to remove the ownership of certain operational activities from the investment manager.

Northern Trust provides investment operations outsourcing services through their Investment Operations Outsourcing (IOO) division. IOO leverages its asset servicing platform that supports such things as entitlements, transaction processing, reconciliations, client reporting, and performance measures. Some of these middle office services are provided to IOO by other Northern Trust groups and are captured in detail in other areas of this document.

IOO provides both full and component outsourcing. Full outsourcing is the outsourcing of the client's middle office and book of record, while component outsourcing is generally trade matching, confirmation, and routing with the possible addition of settlements. Pretrade activity remains the responsibility of the client.

IOO is primarily responsible for coordinating account transitions, trade capture, settlement and reporting, cash and stock reconciliation, fee billing, and client reporting.

The IOO team coordinates both internally with Northern Trust and externally with third parties in managing the setup, modification, closure, and/or transfer of assets for client accounts between brokers, custodians, transfer agents, and fund administrators. Account-related changes or updates are communicated accordingly to ensure parties involved can accurately coordinate back and middle office processes.

Trades executed by the client are communicated to IOO electronically by the client's front office system. Upon receipt of a trade, the Outsourcing System automatically enriches the trade, matches the trade information to the broker confirmation, and instructs the trade to the appropriate
custodian, fund accountant, or other specified party. For full outsourcing clients, the trades are also sent electronically to the Investment Book of Record System.

The IOO team researches unmatched/failing trades based on information from the Outsourcing System and/or custodians. The custodian information is compared to the Outsourcing System to determine the reason for the failure. IOO investigates and resolves failed trades with the counterparties and provides a failed trade report to clients as necessary.

IOO provides cash and security positions to the client on a daily basis. For select clients, IOO reconciles positions between the Investment Book of Record System and the client’s trade order management system daily, which is referred to as the front office reconciliation process. Differences between the front office and Investment Book of Record System are reported to clients and IOO management daily.

The IOO team also reconciles cash and stock between the investment book of record and the custodian prime broker and/or fund administrator, which is referred to as the back-office reconciliation process. Reconciliation reports are generated based on information from the custodian and identified discrepancies between the Investment Book of Record System and custodian, prime broker, or fund administrator. Discrepancies are identified and sourced to relevant departments for further research and resolution. Aged discrepancies are communicated to the client and IOO management.

For select clients, the IOO team performs market value reconciliations between the Investment Book of Record System and the designated custodian, prime broker, or fund administrator. IOO documents an explanation for discrepancies when variances exceed predetermined thresholds. IOO provides the reconciliation, along with explanations for variances above the predetermined thresholds, to the client.

For select clients, the IOO team provides periodic client reporting for their end clients. IOO reviews client reporting for accuracy and reasonableness and prepares reporting packs with backup documentation. Identified exceptions are routed to the originating area for research and resolution. The reports are quality checked and then sent to the client or at the client’s discretion; the reporting may be delivered directly to the end clients.

**TECHNOLOGY**

**GENERAL CONTROLS**

The following describes Northern Trust’s data processing environment and general controls surrounding its systems. General controls establish the control environment in which applications are developed and processed. Therefore, the general data processing procedures have an impact on the effectiveness of controls in trust/custody applications.

**Computer Facilities**

Northern Trust operates two large-scale data centers located in Illinois, which support United States and global custody transaction processing. These data centers are managed by a data center manager and a team of data center staff.

In addition to the main computer facilities located in the Chicago area, remote facilities located in the London, England area support the custody and fund services business. The remote facilities follow the same general data processing and application support procedures as Chicago, or adaptations that better conform to their environment.

Significant computer hardware used to support Northern Trust’s processing needs include IBM® Mainframe, IBM and Sun Unix®, Red Hat Linux, IBM AS/400® (iSeries), VMS (DEC), and Windows servers.

**Organization and Administration**

Information systems activities as they relate to custody and fund services business systems and functions are supported by the following groups within the Technology business unit:

- Computer Operations, which controls data center functions and activities such as batch scheduling, client transmissions, and global network operations center (monitoring)
- Platform Operations, Network Services, and Workgroup Services, which support technical functions and activities such as operating systems, network, and system software and utilities

The establishment of these distinctly separate groups helps ensure that separation of duties controls are in existence between platform operations and application development activities since the above groups report to separate management chains.

The Technology Support teams are independent of the Operations divisions that are responsible for the daily processing of work. The operating divisions have no ability to directly modify production source code or software.
Application teams are generally responsible for the programming, analysis, related consulting and support duties, and the management thereof, related to the various application systems. Application managers report directly into the Head of Technology Business Solutions Officer who reports to the Chief Operating Officer, though they work closely with the business unit general managers to help ensure the applications are closely aligned with the business strategy.

Authorization for the origination and approval of online transactions is controlled by general data security procedures for granting access to production transaction codes to specific computer log-on IDs upon receipt of proper procedures for granting access to production transaction codes to specific computer log-on IDs upon receipt of proper approval.

Changes to production master files are done under the supervision, and/or the authorization, of the responsible application team manager, with the approval, either general or specific, of the business unit management and the user division management.

**Application Development and Documentation Controls**

The general development environment is governed by a software development life cycle (SDLC). Each activity enables staff to derive a better understanding of the requirements of a particular application project or effort. The SDLC process consists of the following activities:

- Planning and Requirements
- Design
- Code and Testing
- Installation/Implementation

For application development projects, the SDLC process is followed to help ensure that business requirements are defined, alternatives are analyzed, the optimal solution is selected, and the results meet business/operating needs. To optimally meet business needs, functional requirements for new application definition and design efforts are prepared in conjunction with, and under the direction of, the user representatives. Affected areas are required to have their representatives involved in the development of automated requirements that pertain to them.

Specifications for new applications are developed by application team staff in conjunction with the user representatives and other stakeholders. User review and approval of the specifications, functional requirements, budget, and priority are required prior to proceeding with the development project.

Testing is performed in the various development stages to help ensure that application expectations have been met and that a quality product has been created. These phases are commonly referred to as unit and systems testing. An application is not allowed to move into the next phase of development until it successfully passes the documented requirements. The tests are executed by application personnel.

Participation by the users in the testing of a new application is critical to help ensure that the product will meet users’ needs. This iteration of the overall testing effort is called User Acceptance Testing (UAT). UAT is completed prior to the application being put into production.

Prior to placing a new application into production, affected area groups give their approval. This generally includes the following groups: the primary users and their management, other affected application systems groups, and Technology management.

**Change Management**

A formal Change Management process is used to provide consistent control over production changes (planned and emergency), including updates to application and operating system software, infrastructure middleware, hardware, network devices and settings, and production job schedules. This process includes the generation and management approval of a change request (CRQ) document, which includes a detailed description of the work to be performed. Information in the CRQ includes:

- A summary of the change being performed
- Verification plans to help ensure effectiveness of the work
- Backout plans for use in case the work needs to be undone
- Description of the emergency (emergency changes only)

All production changes are approved by an authorized approver for the requesting team. For example:

- Planned changes are approved by authorized approvers prior to implementation. The level of approval required is determined by the risk level of the change and whether the change is scheduled for implementation during a moratorium period. Planned changes are classified into different risk levels based on a required risk assessment.

- Emergency changes are approved by authorized approvers after implementation (within seven calendar days). The level of approval required is determined by whether the change is scheduled for implementation during a moratorium period. If the appropriate approvals are not completed on time, an escalation process is invoked.

Secondary approval by an independent change advisory board is required prior to change implementation for high-risk changes and for any changes scheduled to take place during a moratorium.

**Separation of Duties Program (SDP)**

IT developers update production data or code by one of the following methods:

- Use of a third-party team to perform the update
Use of systematic tools to perform the update

Where this is not possible due to technical constraints (e.g., some vended applications), the SDP governs non-systematic updates of production code and data by IT developers. Applications are onboarded into SDP through a multi-stage process, which involves the removal of individual developer access to elevated-privilege user IDs and setup of access to the Enterprise Password Vault (EPV) tool to replace access to these user IDs. The onboarding of applications into SDP is an ongoing, business-as-usual process.

Once onboarded into SDP, application developers and support personnel do not have direct access to elevated-privilege user IDs. Instead, they utilize production user IDs from EPV to make production changes. Passwords checked out from EPV are valid for 24 hours or until released by the developer, whichever comes first. EPV also enforces multi-factor authentication for enhanced security control.

Activity performed with production user IDs from EPV is logged and these logs are monitored by the SDP team. The monitoring process consists of reconciling activity logs, EPV checkout logs, and production CRQs. The SDP team investigates production activity logged that was not reconciled to an approved CRQ.

During the onboarding process, a resource owner is identified as responsible for an application (based on support group of the application). Once onboarding is complete, the Resource Owner is responsible for subsequent and ongoing access reviews for the application. This includes access to the EPV production user IDs as well as other access to the application. Resource owners are responsible to conduct quarterly access reviews.

User Identification and Password Controls

Requests for new employee logical access or changes to existing system access privileges are to be approved by an authorized individual, other than the access recipient, prior to processing. Human Resources notifies the Global Access Control team of employee transfers and sensitive access rights are removed. Network access is automatically removed upon systematic notification of termination from Human Resources.

Minimum password requirements (e.g., minimum length, password expiration, and complexity) have been established in an actively maintained standard that applies across operating system platforms and applications. Where strict application of a compliance requirement may not be technically feasible for an application, upon assessing the risk, management undergoes a formal risk assessment as part of the Technology Risk Management deviation process. Northern Trust utilizes password management software to synchronize passwords across a number of critical applications and provides a single point at which to define the required password settings.

Logical Security Access

Each computer platform as noted above has a unique security system. There is also an application security layer and a general system security layer supported by the hardware vendor. The system security software is as follows for the various operating platforms:

Mainframe/ACF2 The Access Control Facility (ACF2) security software product controls the majority of access to mainframe-based subsystems via unique user IDs and passwords. Some of the subsystems include Time Sharing Option (TSO), Customer Information Control System (CICS), and Remote Job Entry (RJE).

CICS-based applications control access via transaction codes (trancodes) written for the application system. Access to these trancodes is granted to groups or individuals via their ACF2 user IDs and the CICS privilege.

Mainframe/IMS Information Management System (IMS) has its own user ID/password and trancode security similar to, but separate from, the ACF2-controlled CICS transaction processing access.

Within IMS, certain applications have security to allow additional restrictions to the application, such as account-level access control. This security is in addition to that provided by user IDs and passwords.

VMS (DEC) Access to production DEC systems and resources are controlled by VMS via user IDs and passwords. Access security parameters are defined in accordance with Northern Trust’s user password policy requirements.

Unix® Access to production Unix systems is controlled via user IDs and passwords. Unix user/group security is used to protect files in the Unix file system.

Windows Access to production Windows server systems is controlled by the Active Directory Administrator Group Policy. This policy requires unique user IDs and passwords for users.

AS/400® (iSeries) Access to production iSeries systems is controlled by Operating System Security Level 30. Security Level 30 is the setting that requires unique user IDs and passwords for iSeries users.

Failed attempts at access to sensitive accounts on operating systems are logged, and periodic reports are produced and reviewed by IT management. Follow-up actions are taken as necessary. In addition, for Unix production systems, privileged activities by members outside of the core Unix operations team are logged, and acknowledgement requests are sent to the users’ managers to confirm the
access and activities were appropriate. These acknowledgements are recorded and tracked. User access is reviewed by managers at least annually. If not completed within 60 days of the due date the user’s access is suspended until the review is completed by the manager.

Network Security
Externally facing Web-based applications use encryption to protect sensitive data. A minimum key length of 256 bits is used for applications that support transactions. A transaction is defined as a request for Northern Trust to take action that results in financial activity or master file update.

Northern Trust utilizes the Internet to provide the general public access to many important applications. Multiple independent Internet connections have been established for resiliency. Corporate connectivity to the Internet is controlled by a system of firewalls to safeguard Northern Trust’s internal network. Segregated network zones (e.g., DMZs) of various trust levels are in place to separate Northern Trust’s internal network from externally facing servers. Firewall settings are reviewed regularly.

Intrusion detection is performed via a process including real-time examination and correlation of log data from a variety of security devices. This process compares traffic content and patterns to attack signatures, patterns, and hotlists. Log data is sent to the corporate logging solution and is reviewed in real time for event and trend analysis by the internal security operations center. Critical events are logged and followed up on as appropriate.

Northern Trust performs periodic vulnerability assessments of Internet-exposed devices (e.g., Web servers) and provide management with reports of the results. Northern Trust also performs periodic internal vulnerability assessments. Relevant issues or vulnerabilities are promptly addressed.

Procedures are in place to keep operating systems updated with supported versions and to risk assess operating system patches/fixes and apply them based upon the risk profile. In the event that particular operating systems cannot be updated to current vendor-supported versions due to application or other limitations, management undergoes a formal risk assessment as part of the Technology Risk Management deviation process.

Remote user access is limited to authorized users. Northern Trust employees utilize a virtual private network (VPN) infrastructure, which includes multi-factor authentication and application-level passwords and IDs.

Data Center Access and Protection
Physical access to Northern Trust’s data centers is controlled by computer-based security systems or by locks and keys. Where applicable, entry to the data centers is controlled via an encoded employee identification card and a secondary authentication method (e.g., biometric scanner, personal identification number, etc.). Telecommunication closets are controlled by an encoded identification card or lock and key. Keys are limited to key personnel and locks are changed when needed. Employees requiring ongoing access to the data centers are approved by appropriate management prior to access being granted. Management reviews data center access privileges at least semi-annually to validate that access is appropriate.

Computer Operations
The primary computer automated job scheduling system is Control-M from BMC Software, Inc. This product provides for an automated job-processing environment that precludes the need for manual routine computer job submission. Northern Trust actively monitors the production job schedule and has established formal policies and procedures to prescribe how routine job processing events should be addressed by area personnel. Additional job-specific instructions may be summarized in computer operations documentation procedures and reviewed by operators when necessary. Control-M posts alerts to operator panels for all exceptions. An incident ticket is automatically opened and assigned to the operations staff. Staff members analyze tickets and reassign them to the correct application group. Data transmissions are also actively monitored, and abnormal conditions are addressed according to established formal procedures.

Access to the production job schedule is restricted to authorized individuals. Changes to access are either removed or granted depending upon any personnel changes. Both planned and emergency modifications to the production job schedule follow the comprehensive production change management process detailed in the “Change Management” section above.

Systematic controls exist to help ensure that external data transmissions received and sent by Northern Trust are authorized and complete based on predefined criteria. A dedicated Transmission Setup team, as well as the Network Operation team, handles the functions and tasks related to the creation and support of transmission jobs. Documented and published procedures exist for the review of transmission requests to ensure completeness and accuracy. Additionally, requests are reviewed to help ensure proper authorization.

Backup Methodology and System Availability
For relevant geographic locations, Northern Trust has two peer data centers that are resident in two distinctly separate locations. A comprehensive risk analysis is completed to determine whether there are shared risks between these two data centers.

Each data center is designed and equipped to accommodate system testing and data backup. Use of the backup strategies helps ensure critical data files are stored at both the primary and backup locations. Critical data is also backed up to tape and stored at the alternate data center.
CUSTODY AND FUND SERVICES BUSINESS APPLICATIONS AND KEY SYSTEM INTERFACES

A description of the primary application suites that support client transaction processing is as follows. The systems listed below, all of which are hosted at Northern Trust, comprise multiple individual applications designed to perform a specific function in the system process within the scope of the report.

<table>
<thead>
<tr>
<th>System</th>
<th>Primary Process(es)</th>
<th>Primary Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust System</td>
<td>▪ Account Coding ▪ Transition Events ▪ Securities Reconcilement ▪ Vault Security ▪ Cash and Foreign Exchange-Related Movements ▪ Cash Reconcilement ▪ Trade Communication and Settlement ▪ Trade Communication and Settlement – Derivatives ▪ Income Collections ▪ Nonresident Alien Tax Withholding ▪ Client Accounting and Reporting ▪ Benefit Payments ▪ Investment Accounting and Reporting</td>
<td>Refers to the core trust and custody accounting system that records security positions, cash, and security transaction detail at the client account level. The Trust System provides multicurrency accounting and reporting for global custody clients. A master file of transaction history is maintained on the system.</td>
</tr>
<tr>
<td>Asset Coding System</td>
<td>▪ Asset Coding</td>
<td>Utilized to set up and maintain common data about securities held by clients. Vendor feeds update the Asset Coding System with the most current security data.</td>
</tr>
<tr>
<td>Benefit Payment System</td>
<td>▪ Benefit Payments</td>
<td>Processes recurring and onetime benefit payments to participants in client plans. The system maintains a database of payment parameters for recurring payments.</td>
</tr>
<tr>
<td>Cash Movement System</td>
<td>▪ Cash-Related Movements ▪ Active Collateral Management ▪ Benefit Payments ▪ Private Equity Fund Administration</td>
<td>Utilized by Operations and clients to initiate cash transactions (e.g., wire transfers, check issuances, and account transfers). The system is interfaced with applicable external electronic payment systems to execute the transactions.</td>
</tr>
<tr>
<td>Collateral Management System</td>
<td>▪ Active Collateral Management</td>
<td>Processing system for collateral management that calculates net exposure, collateral requirements, and interest.</td>
</tr>
<tr>
<td>Compliance Analyst System</td>
<td>▪ Investment Risk and Analytical Services</td>
<td>Maintains client investment guidelines and monitors guidelines for investment guideline violations.</td>
</tr>
<tr>
<td>Corporate Actions System</td>
<td>▪ Corporate Actions</td>
<td>Captures notification of capital changes from external vendors and communicates decision requests to clients.</td>
</tr>
<tr>
<td>Depository Reconciliation System</td>
<td>▪ Securities Reconciliation</td>
<td>Performs daily reconciliation of activity and positions between depository records and Northern Trust records.</td>
</tr>
<tr>
<td>ETD Derivatives Trade Capture System</td>
<td>▪ Trade Communication and Settlement – Derivatives</td>
<td>Supports back-office processing, clearing, and settlement for exchange-traded derivatives, including futures and options.</td>
</tr>
<tr>
<td>OTC Derivatives Trade Capture System</td>
<td>▪ Trade Communication and Settlement – Derivatives</td>
<td>Supports back-office processing, clearing, and settlement for over the counter derivatives.</td>
</tr>
<tr>
<td>FX System</td>
<td>▪ Foreign Exchange-Related Movements</td>
<td>FX deal entry system utilized to process FX transactions on behalf of clients.</td>
</tr>
<tr>
<td>Fund Accounting System</td>
<td>▪ Unitized Valuation Reporting Services ▪ Fund Accounting</td>
<td>Investment accounting system used for performing functions such as calculating net asset values (NAVs), daily accruals of income, expenses, management fees, performance fees, and cash movements. Additionally, includes the tool utilized to manage exceptions that identifies differences and variances outside of pre-established thresholds in the NAV process.</td>
</tr>
</tbody>
</table>
### CUSTODY AND FUND SERVICES BUSINESS APPLICATIONS AND KEY SYSTEM INTERFACES (continued)

<table>
<thead>
<tr>
<th>System</th>
<th>Primary Process(es)</th>
<th>Primary Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Securities Lending (GSL) System</td>
<td>‣ Securities Lending</td>
<td>Processes U.S. and international securities lending transactions. The system monitors securities lent, performs mark-to-market calculations, allocates earnings, and produces client statements.</td>
</tr>
<tr>
<td>Global Trade System</td>
<td>‣ Trade Communication and Settlement</td>
<td>Trade processing system for non-U.S. trades received from external (i.e., investment managers and brokers) and internal parties. The system facilitates posting to the Trust System and controls trades from notification to settlement.</td>
</tr>
<tr>
<td>Income Collections System</td>
<td>‣ Income Collections</td>
<td>Facilitates the calculation of expected income receipts and the posting of income to client accounts. The system is interfaced with outside vendors to receive input of necessary data (e.g., dividends declared) to calculate the income to be received.</td>
</tr>
<tr>
<td>Institutional Investor Passport</td>
<td>‣ Client Accounting and Reporting</td>
<td>A Web portal that provides online client access to account information stored in the above-described systems. Passport contains download capability to transfer data to client systems, as well as a client general ledger component.</td>
</tr>
<tr>
<td>Management Reporting System</td>
<td>‣ Client Accounting and Reporting</td>
<td>Creates periodic client statements, including Form 5500 required schedules.</td>
</tr>
<tr>
<td>Outsourcing System</td>
<td>‣ Investment Operations Outsourcing</td>
<td>Trade processing system and book of record for IOO clients.</td>
</tr>
<tr>
<td>Performance Reporting System</td>
<td>‣ Investment Risk and Analytical Services</td>
<td>Generates performance reporting for IRAS clients.</td>
</tr>
<tr>
<td>Pricing System</td>
<td>‣ Asset Valuation</td>
<td>Scrubs the prices of assets (equities, bonds, futures, etc.) received from various vendor feeds and authorized sources to help ensure assets reflect the most accurate price possible.</td>
</tr>
<tr>
<td>‣ Unitized Valuation Reporting Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‣ Fund Accounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‣ Cross Border Pooling Fund Accounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Equity System</td>
<td>‣ Private Equity Fund Administration</td>
<td>Supports investment and partnership accounting, portfolio management and analysis, and investor servicing solutions for private equity funds administered.</td>
</tr>
<tr>
<td>Security Movement and Control (SMAC) System</td>
<td>‣ Trade Communication and Settlement</td>
<td>Monitors the locations of physical and book entry securities held by Northern Trust in its vaults and at depositories.</td>
</tr>
<tr>
<td>‣ Vault Security</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share Registration System</td>
<td>‣ Transfer Agency</td>
<td>Utilized to process subscriptions and redemptions of units and produce contract notes for clients investing into funds for which Northern Trust serves as transfer agent.</td>
</tr>
<tr>
<td>Tax Manager System</td>
<td>‣ Tax Withholding and Reclamations</td>
<td>Performs tax reclaim calculations using stored and updated tax rates, and the system tracks outstanding reclains.</td>
</tr>
<tr>
<td>Trade Capture System</td>
<td>‣ Trade Communication and Settlement</td>
<td>Captures trade instructions received electronically from external (e.g., investment managers and brokers) and internal sources and facilitates automated posting to the Trust System. The system feeds exceptions preventing settlement to the Trade System for resolution.</td>
</tr>
<tr>
<td>Trade Order Entry System</td>
<td>‣ Trade Communication and Settlement</td>
<td>Allows clients and internal partners to enter trade information for execution or settlements through Northern Trust’s systems.</td>
</tr>
<tr>
<td>Trade System</td>
<td>‣ Trade Communication and Settlement</td>
<td>Trade processing system for U.S. trades received from external (e.g., investment managers and brokers) and internal parties. The system facilitates posting to the Trust System and controls trades from notification to settlement.</td>
</tr>
<tr>
<td>‣ Active Collateral Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CUSTODY AND FUND SERVICES SUBSERVICE ORGANIZATIONS

Custody and Funds Services uses subservice organizations to perform a range of functions to support their custody and funds services where specific expertise is required. The scope of this report does not include controls and related control objectives at any of the subservice organizations. Custody and Funds Services assumes that the following complementary subservice organization controls (CSOCs) are performed by the subservice organizations and are necessary to achieve the control objectives listed in the table below. The following describes the types of subservice organizations used by Custody and Funds Services:

<table>
<thead>
<tr>
<th>Subservice Organization</th>
<th>Complementary Subservice Organizations Controls</th>
<th>Control Objective Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that infrastructure installation, as well as infrastructure changes and maintenance are authorized, tested, properly implemented, and documented.</td>
<td>Technology Control Objective: 1</td>
</tr>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that logical access to the application data files and programs is limited to properly authorized individuals.</td>
<td>Technology Control Objective: 2</td>
</tr>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that the computer network for the applications, including remote access, is adequately secured and monitored to allow permitted traffic, and protect against inappropriate intrusions.</td>
<td>Technology Control Objective: 3</td>
</tr>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that physical access to data center equipment is limited to properly authorized individuals.</td>
<td>Technology Control Objective: 4</td>
</tr>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that computer processing is authorized, scheduled, and performed in accordance with prescribed procedures and deviations are identified and resolved, and that external data transmissions are complete and authorized.</td>
<td>Technology Control Objective: 5</td>
</tr>
<tr>
<td>CGI Group Inc.</td>
<td>For the data center facility it operates in Canada, CGI Group Inc. should have controls in place to provide reasonable assurance that the data is routinely backed up and is available for restoration in the event of processing errors.</td>
<td>Technology Control Objective: 6</td>
</tr>
<tr>
<td>Virtus Data Centres LTD.</td>
<td>For the data center facility it operates in United Kingdom, Virtus Data Centres LTD. should have controls in place to provide reasonable assurance that infrastructure installation, as well as infrastructure changes and maintenance are authorized, tested, properly implemented, and documented.</td>
<td>Technology Control Objective: 1</td>
</tr>
<tr>
<td>Virtus Data Centres LTD.</td>
<td>For the data center facility it operates in United Kingdom, Virtus Data Centres LTD. should have controls in place to provide reasonable assurance that physical access to data center equipment is limited to properly authorized individuals.</td>
<td>Technology Control Objective: 4</td>
</tr>
</tbody>
</table>
COMPLEMENTARY USER ENTITY CONTROLS

The controls at Northern Trust over the processing of transactions for a given client account cover only a portion of the overall internal controls of that account. It is not feasible for the control objectives relating to the processing of transactions to be solely achieved by Northern Trust. Therefore, the internal controls of clients should be evaluated in conjunction with Northern Trust's controls and testing summarized in Section IV of this report.

This section highlights those internal control responsibilities that Northern Trust believes each client should have in place for their account(s). These client-based control procedures are to be addressed by clients and have been considered by Northern Trust in developing its controls as described in this report. Accordingly, in order for clients to rely on the controls reported on herein, each client must evaluate its own internal controls to determine whether the following procedures are in place. This list does not purport to be, and is not, a complete listing of the controls that provide a basis for the assertions underlying the financial statements of clients.

<table>
<thead>
<tr>
<th>Complementary User Entity Control</th>
<th>Relevant Control Objective(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructions and information provided by Northern Trust clients should be in accordance with the provisions of the trust/custody agreement, servicing agreement, or other applicable governing agreements or documents between Northern Trust and its clients.</td>
<td>Control Objectives: 3, 4, 5, 6, 17, 39, 40, 43, 45</td>
</tr>
<tr>
<td>Sufficient controls over written communications utilized to transmit instructions to Northern Trust for processing transactions should exist at client locations to limit the origination of transmissions to properly authorized individuals at the clients, including their appointed representatives (e.g., investment manager). Clients are responsible for authenticating directions, upon Northern Trust's request, prior to processing.</td>
<td>Control Objectives: 3, 4, 5, 6, 17, 39, 40, 43, 45</td>
</tr>
<tr>
<td>Timely written notification of changes to an account, its objectives, beneficiaries or participants, and investment managers should be adequately communicated to Northern Trust.</td>
<td>Control Objectives: 1, 5, 6, 17, 43</td>
</tr>
<tr>
<td>Timely written notification of changes to individuals authorized to instruct Northern Trust of activities on behalf of the clients should be communicated to Northern Trust.</td>
<td>Control Objectives: 3, 4, 5, 6, 17, 39, 40, 43, 45</td>
</tr>
<tr>
<td>Clients, and their appointed representatives (e.g., investment manager), are responsible for providing complete and accurate holding and valuation information on assets not custodied by Northern Trust but held on record in client accounts, including timely notification of security and derivative trades not executed by Northern Trust.</td>
<td>Control Objectives: 24, 25, 26, 28, 30, 31, 32, 33, 34, 35, 36, 37, 45, 46</td>
</tr>
<tr>
<td>Timely review of reports provided by Northern Trust of trust/custody account balances and related activity should be performed by clients and/or their appointed investment managers and balances/activity agreed to client or investment manager records and that of their actuaries/advisors. If applicable, written notice should be provided to Northern Trust of discrepancies as compared to client/advisor records.</td>
<td>Control Objective: 24</td>
</tr>
<tr>
<td>Clients are responsible for the accuracy and source of prices provided by them to Northern Trust for special-type assets where prices are otherwise unavailable.</td>
<td>Control Objectives: 19, 41</td>
</tr>
<tr>
<td>Clients are responsible for controls over client-owned, computer-based data files transmitted between the client and Northern Trust or stored on client's equipment. Examples of risks that should be evaluated and controlled by the client include, but are not limited to, data or information disclosure, accidental or intentional data modification, the authority to perform computer file transfers (such as uploads or downloads of client data stored on Northern Trust systems), and loss of data.</td>
<td>Control Objectives: 5, 6, 17, 28, 45</td>
</tr>
<tr>
<td>Clients are responsible for maintaining the integrity of any connection to Northern Trust from any other network connection, (e.g., the Internet, leased line, etc.). This should be achieved via the deployment of control mechanisms (e.g., firewalls, routers, switches, etc.) to monitor and manage traffic between the client network and the client connection points with Northern Trust network(s) and by limiting access to client systems to only appropriate individuals.</td>
<td>Control Objectives 5, 6, 17, 24, 28 Technology Control Objective: 4</td>
</tr>
<tr>
<td>Clients should maintain adequate records (e.g., data files, paper trails, etc.) to recover transactions entered since the last processing (i.e., file transmission) and backup cycle.</td>
<td>Control Objectives: 5, 6, 17, 28, 43 Technology Control Objective: 6</td>
</tr>
<tr>
<td>Clients are responsible for implementing security administration procedures necessary to properly restrict access of client personnel to Northern Trust systems and provide timely written notification to Northern Trust of changes to employee access privileges.</td>
<td>Control Objectives: 3, 4, 17</td>
</tr>
<tr>
<td>Clients are responsible for maintaining the confidentiality of assigned IDs and passwords relating to Northern Trust applications and ensuring that such IDs and passwords are not shared resulting in the compromise of system access authorities or information security.</td>
<td>Control Objectives: 3, 4, 17</td>
</tr>
</tbody>
</table>
OTHER INFORMATION ABOUT MANAGEMENT’S DESCRIPTION
Northern Trust Corporation’s control objectives and related controls are included in Section IV of this report, “NORTHERN TRUST CORPORATION’S CONTROL OBJECTIVES AND RELATED CONTROLS AND INDEPENDENT SERVICE AUDITOR’S TESTS OF CONTROLS AND RESULTS OF TESTS.” Although the Control Objectives and related controls are presented in Section IV, they are an integral part of Northern Trust Corporation’s description of the system.
IV. NORTHERN TRUST CORPORATION'S CONTROL OBJECTIVES AND RELATED CONTROLS AND INDEPENDENT SERVICE AUDITOR'S TESTS OF CONTROLS AND RESULTS OF TESTS
INFORMATION PROVIDED BY THE INDEPENDENT SERVICE AUDITOR

PURPOSE AND SCOPE OF REPORT
This report on the controls placed in operation and tests of the operating effectiveness of those controls is intended to provide specified users with information sufficient to obtain an understanding of controls at Northern Trust. This information about the controls of Northern Trust that are likely to be relevant to a user entity’s internal control over financial reporting may reduce the assessed level of control risk below the maximum for certain financial statement assertions. This report, when coupled with an understanding of internal control at user entities, is intended to assist in the assessment of internal control surrounding transactions processed through Northern Trust.

KPMG’s examination was conducted in accordance with the attestation standards issued by the American Institute of Certified Public Accountants and in accordance with International Standard on Assurance Engagements 3402 (ISAE 3402), “Assurance Reports on Controls at a Service Organization”, issued by the International Auditing and Assurance Standards Board. It is each client organization’s responsibility to evaluate this information in relation to internal control at their organization to obtain an understanding of internal control and assess control risk. Northern Trust’s and clients’ portions of the controls must be evaluated together. If effective client internal controls are not in place, the controls of Northern Trust may not compensate for such weaknesses.

TESTS OF OPERATING EFFECTIVENESS OF SPECIFIC CONTROLS
KPMG’s examination of the operating effectiveness of certain controls of the Northern Trust was restricted to the control objectives and the related controls specified by Northern Trust in the matrices of controls and testing contained in Section IV and was not extended to procedures in effect at client locations or other controls that may be described in Section III but not listed in the aforementioned matrix.

KPMG’s tests of the effectiveness of controls included such tests as were considered necessary in the circumstances to evaluate whether those controls, and the extent of compliance with them, were sufficient to provide reasonable, but not absolute, assurance that the specified control objectives were achieved throughout the period covered by this report. In selecting particular tests of the operating effectiveness of controls, the following were considered: (a) the nature of the items being tested, (b) the types and competence of available evidential matter, (c) the nature of the control objectives to be achieved, and (d) the expected efficiency and effectiveness of the test.

In addition, when using information produced by Northern Trust, our procedures included an evaluation of the reliability of such information for our purposes by obtaining evidence about its completeness and accuracy.

Certain work of the internal audit function (Audit Services) was used in performing tests of controls. Procedures performed by Audit Services were considered in determining the tests to be conducted by KPMG. Accordingly, the effectiveness of the Audit Services was evaluated and tested including: (a) assessment of the competence and objectivity of the Audit Services function and the personnel within the department; (b) evaluation of the scope of their work and the adequacy of audit programs; (c) review and testing of their workpapers to assess the adequacy of their documentation, supervision, and review; and (d) assessment of the conclusions reached and reports issued. Members of Northern Trust’s Internal Audit function performed tests of controls for all the control objectives except control objectives 2, 4, 10 and 23. Where the work of Internal Audit was utilized, KPMG LLP tested the work through a combination of select independent testing and reperformance.

Test procedures performed in connection with determining the operating effectiveness of controls detailed in the matrices in Section IV are described below:

<table>
<thead>
<tr>
<th>Test Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>Inspected documents, reports, or electronic files that contain evidence of the performance of the control. This includes, among other things, inspection of client-directed documents, recorded phone lines, reading of reconciliations and management reports that age, and quantify reconciling items, to assess whether balances and reconciling items are properly monitored, controlled, and resolved on a timely basis.</td>
</tr>
<tr>
<td>Reperformance</td>
<td>Reapplied the relevant control. This includes, among other things, reviewing reconciliations for proper sources of balances, reasonableness of reconciling items, and accuracy of mathematical calculations.</td>
</tr>
<tr>
<td>Observation</td>
<td>Viewed the application of specific controls by Northern Trust personnel.</td>
</tr>
<tr>
<td>Inquiries</td>
<td>Interviewed appropriate Northern Trust personnel about the relevant controls.</td>
</tr>
</tbody>
</table>

The Management Response statements, provided by the management of Northern Trust Corporation, included within Section IV, are the responsibility of the management of Northern Trust Corporation.
## NORTHERN TRUST CORPORATION’S CONTROL OBJECTIVES AND RELATED CONTROLS AND INDEPENDENT SERVICE AUDITOR’S TESTS OF CONTROLS AND RESULTS OF TESTS

### ACCOUNT CODING

**Control Objective 1:** Controls provide reasonable assurance that account information is set up accurately on the Trust System.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Account Administration or Operations inputs account coding in the Trust System. Account Administration or Operations performs a secondary review of the key setup details to help ensure that the coding is input accurately per client documentation.</td>
<td>For a selection of new accounts, inspected the account setup audit trail via manual form or system to determine that the account coding was secondarily reviewed for accuracy.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. In the United States, for the Corporate, Insurance, Public Funds, and Not-for-Profit C&amp;IS segments, Account Administration relationship staff performs a semi-annual review of key account coding and completes the Account Coding Review Checklist to help ensure account coding is accurate.</td>
<td>For a selection of semi-annual account coding reviews and relationship staff, inspected the Account Coding Review Checklist to determine the reviews were completed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

### TRANSITION EVENTS

**Control Objective 2:** Controls provide reasonable assurance that transition events are processed completely and accurately.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For transition events, asset lists and delivery instructions are received from the prior trustee/custodian and the transition plans are monitored by Transitions Services to help ensure all assets are properly loaded to the Trust System. Transition Services performs a final post-transition reconciliation from information received during settlement and/or statements provided from the counterparty to the Trust System. Reconciling items are identified, researched, tracked until resolved, and communicated to management if still outstanding. A secondary review of the reconciliation is performed and evidenced.</td>
<td>For a selection of account transitions, inspected asset listings and delivery instructions to determine they were received and monitored. For a selection of account transitions, inspected the final post-transition reconciliation to determine that it was completed, and reconciling items were identified, researched, tracked until resolved and communicated to management, if still outstanding.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

49
### TRANSITION EVENTS (continued)

**Control Objective 2:** Controls provide reasonable assurance that transition events are processed completely and accurately (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For transition events, asset lists and delivery instructions are received from the prior trustee/custodian and the transition plans are monitored by Transitions Services to help ensure all assets are properly loaded to the Trust System. Transition Services performs a final post-transition reconciliation from information received during settlement and/or statements provided from the counterparty to the Trust System. Reconciling items are identified, researched, tracked until resolved, and communicated to management if still outstanding. A secondary review of the reconciliation is performed and evidenced.</td>
<td>For a selection of account transitions, inspected the transition documentation to determine that the secondary sign-off was evidenced.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

*See additional controls under Trade Communication and Settlement, control objective 5.*  
*See additional controls under Cash Reconciliation, control objective 9.*  
*See additional controls under Securities Reconciliation, control objective 10.*

### TRANSACTION AUTHORIZATION

**Control Objective 3:** Controls provide reasonable assurance that client instructions for cash and foreign exchange-related transactions are received from authorized sources and processed accurately.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
</table>
| 1. Account Administration or Operations reviews client transaction instructions (i.e., cash, limited partnerships, free deliveries, and foreign exchange) for indication that the instructions were received from an authorized party(ies) per the authorized signer list. | For a selection of Wealth Management Foundation and Institutional Advisor transactions, inspected client transaction instructions and authorized signer lists to determine that individuals providing direction were authorized.  
For a selection of C&IS and Wealth Management Global Family & Private Group transactions, inspected client transaction instructions or the document imaging system for evidence that the instruction was reviewed to determine it was from an authorized party. | No exception noted.  
No exception noted. |


Control Objective 3: Controls provide reasonable assurance that client instructions for cash and foreign exchange-related transactions are received from authorized sources and processed accurately (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disbursements from custody/agency accounts are subject to authentication (i.e., client callbacks) as dictated by business unit procedures.</td>
<td>For a selection of Wealth Management Foundation and Institutional Advisor disbursements subject to authentication, inspected the callback details documented on the client instruction or within the document imaging system to determine that authentication was performed. For a selection of C&amp;IS and Wealth Management Global Family &amp; Private Group disbursements subject to authentication, inspected the callback details documented on the client instruction or within the document imaging system to determine that authentication was performed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>Operations inputs outgoing cash transactions and FX transactions into the Cash Movement System or the FX System, respectively, per client instructions. The input is independently reviewed for accuracy as systematically required by the Cash Movement System and the FX System.</td>
<td>Observed the system configuration of the Cash Movement System and the FX System to determine that they were configured to prevent a user from both initiating and approving the same outgoing cash or FX transaction.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>Cash movements are automatically matched to expected cash receipts within the Cash Movement System and operating personnel research and resolve unmatched cash movements daily as reflected in the Case Audit History.</td>
<td>For a selection of unmatched cash movements, inspected the Case Audit History to determine that they were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**TRANSACTION AUTHORIZATION (continued)**

Control Objective 4: Controls provide reasonable assurance that trade and derivative instructions are received from authorized sources.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> The majority of trades are transmitted to Northern Trust electronically through a secured means of communication from the client or investment manager. Prior to loading to the Trust System, the Trade Capture System validates that trades are received from an authorized source through the use of identifier and account numbers. Electronic trades received from an unauthorized source are automatically rejected and are not processed. Trades received for invalid accounts are routed to a repair queue or exception report where an analyst researches, resolves, and processes the trade accordingly.</td>
<td>Observed that the Trade Capture System generated a reject message for a trade received from an unauthorized source. For a selection of trades routed to the repair queue or exception reports, inspected e-mail communications to determine the trades were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> The Derivatives team processes ETD, OTC, and CCP custody instructions received manually based on authenticated standard settlement instructions from the investment manager. Upon receipt, standard settlement instructions are authenticated via callback, secondarily reviewed as evidenced through an electronic checklist which includes the preparer and reviewer prior to setup on the system.</td>
<td>For a selection of standard settlement instructions, inspected instructions to determine they were secondarily reviewed as evidenced through an electronic checklist which included the preparer and reviewer prior to setup on the system. For a selection of manual payments, inspected the Cash Movement System to determine the payments were processed utilizing an existing profile, an authenticated standard settlement instruction, and were secondarily reviewed.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
TRADE COMMUNICATION AND SETTLEMENT

Control Objective 5: Controls provide reasonable assurance that trade instructions and subsequent settlement of the transactions are recorded completely, accurately, and in a timely manner.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 For U.S. trades, the Trade Capture System performs checks to verify that the transmission from the investment manager is complete and recalculates trade figures input to help ensure accuracy and exceptions are routed to a queue for resolution. Accepted transmissions are then routed to the Trade System, which performs additional validations to identify potential problems such as incomplete trades, duplicate trades, rejects, and fails. Discrepancies identified by the Trade System appear on exception reports. The queues and exception reports, which include manual trades, are reviewed and exceptions are researched and resolved prior to settlement date.</td>
<td>Observed the processing of trade notification transmissions with incomplete, duplicate, rejected, or failed trade information to determine that the Trade Capture System or Trade System properly rejected the notifications. For a selection of exception items from the queue and reports, inspected e-mail communications, trade updates, and cancellations to determine that the exceptions were researched and resolved prior to settlement date.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 For global (non-U.S.) trades, the Trade Capture System performs checks to verify that the transmission from the investment manager is complete and recalculates trade figures input to help ensure accuracy and exceptions are routed to a repair queue for resolution. Accepted transmissions are then routed to the Global Trade System, which performs additional validations to identify potential problems with a trade such as incomplete trades, duplicate trades, rejects, and fails. Discrepancies identified by the Global Trade System appear in the repair queue. The repair queue is reviewed throughout the day, and exceptions, which include manual trades, are researched and resolved in a timely manner.</td>
<td>Observed the processing of trade notification transmissions with incomplete, duplicate, rejected, or failed trade information to determine that the Trade Capture System or Global Trade System properly rejected the notifications. For a selection of exception items from the queue, inspected e-mail communications, updated instructions, and cancellations processed as a result of exception items to determine that the exceptions were researched and resolved prior to settlement date.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Trades that are not successfully matched or posted to the Trust System appear on various exception reports. A daily report is also produced from the Trust System that shows projected settlements plus failed settlements. Settlement team clerks review failed trade reports and perform the necessary research and resolution or if necessary escalates the failed trades to the appropriate Client Servicing team for research and resolution in a timely manner in accordance with market practice.</td>
<td>For a selection of exception items, inspected e-mail communications, as well as updated and reversed transactions to determine that the exceptions were researched and resolved in a timely manner.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**TRADE COMMUNICATION AND SETTLEMENT (continued)**

**Control Objective 5:** Controls provide reasonable assurance that trade instructions and subsequent settlement of the transactions are recorded completely, accurately, and in a timely manner (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
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</tr>
</thead>
<tbody>
<tr>
<td>4 Limited partnership transactions received into PED (Private Equity Desktop) which are verified to the capital call letter for accuracy. The transaction is reviewed by one technician and released by an independent technician on value date.</td>
<td>Observed the processing of a transaction through the Private Equity Desktop to determine that the system prevented a user from both reviewing and releasing the same limited partnership transaction. For a selection of limited partnership transactions, inspected and compared the capital call letter to the Private Equity Desktop to determine date of wire and amount of wire matched. In addition, inspected the Private Equity Desktop to determine the transaction was released on value date.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>5 Account Administration or Operations inputs trades (e.g., commingled funds and mutual funds) in the Trade Order Entry System per client instructions. The input is secondarily reviewed for accuracy in accordance with business unit procedures.</td>
<td>For a selection of trades input in the Trade Order Entry System, inspected the electronic sign-off within the Trade Order Entry System to determine the input was secondarily reviewed in accordance with business unit procedures.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

**TRADE COMMUNICATION AND SETTLEMENT – DERIVATIVES**

**Control Objective 6:** Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner.

<table>
<thead>
<tr>
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<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
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</thead>
<tbody>
<tr>
<td>1 Custody and IOO derivative transactions manually input into the Trust System and OTC Derivatives Trade Capture System by the Derivatives team are secondarily reviewed for accuracy, as systematically required.</td>
<td>Observed the system configuration of the Trust System and the OTC Derivatives Trade Capture System to determine that they are configured to require a secondary review of manual transactions.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 For global custody ETD activity that is manually input into the ETD Derivatives Trade Capture System, position reconciliations between the Trust System and the broker are performed daily by an automated reconciliation system to ensure accuracy of the input. Reconciling items are referred to the Derivatives team for research and resolution.</td>
<td>For a selection of global and domestic custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements to identify differences between the Trust System and the broker.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 6: Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 For domestic custody ETD activity that is manually input into the ETD Derivatives Trade Capture System, a manual position reconciliation is performed daily between the ETD Derivatives Trade Capture System and the investment manager and an automated reconciliation is performed between the Trust System and the ETD Derivatives Trade Capture System to ensure accuracy. Reconciling items are referred to the Derivatives team for research and resolution.</td>
<td>For a selection of dates and reconciliations prepared manually for ETD and IOO ETD transactions, inspected the reconciliation to determine that it was performed and inspected the daily checklist to determine that the reconciliations were secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>For IOO ETD activity that is manually input into the ETD Derivatives Trade Capture System, a manual reconciliation is performed daily between the Trust System and the broker to help ensure accuracy. The reconciliations are secondarily reviewed for completeness and accuracy, as evidenced via sign-off on the daily checklist.</td>
<td>For a selection of ETD, OTC and CCP derivative accounts, compared the Trust system positions to the broker statement positions to determine they reconciled and the data was not altered as of March 1, 2018 and March 2, 2018.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>Reconciling items are downloaded into a reconciliation data repository and are researched and resolved in a timely manner in accordance with corporate standards.</td>
<td>For a selection of reconciling items from manual and automated custody and IOO ETD reconciliations, inspected the system Audit Trail which reflects when the reconciling item were matched or resolved, reversal entries or the next day’s reconciliations to determine the items were researched, and resolved timely in accordance with corporate standards.</td>
<td>For 10 of 97 reconciling items tested, the items were not resolved timely. The exceptions were noted for the ETD custody transactions.</td>
</tr>
<tr>
<td>Management response: Reconciliation breaks are reviewed and remediated in accordance with Northern Trust standards. These standards have been established to outline requirements for managing reconciliation breaks. The standards require aging and monitoring of reconciliation breaks that remain outstanding between the investment manager and Northern Trust. This ensures that inherent risks are understood and transparent across all levels of the organization including senior management and other departments independent of the originating department.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Control Objective 6: Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner (continued).

<table>
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<tr>
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<tbody>
<tr>
<td>2</td>
<td></td>
<td>Management response (continued):</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The exceptions noted above were managed in accordance with these standards and have been reviewed through an oversight meeting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The origination of the specific reconciliation breaks resulting in exceptions are deemed low risk and are closely monitored on a weekly, monthly and quarterly basis. Furthermore, management has deployed a project team in April 2018 to evaluate the ETD end to end operational model and ultimately resolve the system短coming causing these specific reconciliation breaks. The targeted completion of this evaluation including action plan is scheduled for end of 2018.</td>
</tr>
</tbody>
</table>
**TRADE COMMUNICATION AND SETTLEMENT – DERIVATIVES (continued)**

Control Objective 6: Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner (continued).

<table>
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<tbody>
<tr>
<td>3 For investment manager statements received, OTC custody trades are reconciled between the Trust System and the investment manager. The reconciliations are secondarily reviewed for completeness and accuracy, as evidenced via sign-off on the checklist. For counterparty statements received, OTC and CCP IOO positions are reconciled between the OTC Derivatives Trade Capture System or the Trust System, and the counterparty. The reconciliations are secondarily reviewed for completeness and accuracy, as evidenced via sign-off on the checklist. Reconciling items are reported in a reconciliation data repository and are researched and resolved in accordance with corporate standards.</td>
<td>For a selection of dates and OTC custody and OTC and CCP IOO position reconciliations, inspected the reconciliation to determine that it was performed and inspected the checklist to determine that it was secondarily reviewed. For a selection of OTC custody and OTC and CCP IOO reconciling items, inspected list of reconciling items for subsequent dates to determine the reconciling items no longer appeared on the list indicating the items had been researched and resolved.</td>
<td>No exception noted. For 2 of 101 reconciling items tested, the items were not resolved timely. The exceptions were noted for the Custody OTC transactions. <strong>Management response:</strong> The purpose of this control is to provide reasonable assurance over the completeness of trades recorded in the custody book of record versus those of an external asset manager. In the two examples identified, it was confirmed that the asset manager had failed to instruct Northern Trust. The appropriate follow up was completed with the asset manager to procure the missing trade instructions. The timeliness of resolution of the identified missing trade instructions is reliant on the responsiveness of the asset manager. In these examples, there was no adverse impact on Northern Trust clients as a result of the asset manager's delay in instructing the trades.</td>
</tr>
</tbody>
</table>
Control Objective 6: Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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<tbody>
<tr>
<td><strong>4</strong></td>
<td>For CCP custody activity, a daily cash settlement reconciliation is performed between the Trust System and the brokers appointed by the investment managers. Reconciling items are reported in a data repository and are researched and resolved in accordance with corporate standards.</td>
<td>For a selection of custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements to identify differences between the Trust System and the broker. Inspected reconciliation system match rules utilized to generate exceptions to assess completeness and adequacy of the rules to determine that differences between the Trust System and the brokers are identified. For a selection of reconciling items, inspected the Audit Trail which reflects the date the reconciling item was resolved or matched to determine that they were researched and resolved in accordance with corporate standards.</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>The IOO Derivative Outsourcing Operation Team reconciles ETD activity between broker statements/feeds/confirmations and the ETD Derivatives Trade Capture System daily. A cash reconciliation is also performed between the broker and the Trust System at least three times a week. The reconciliations are secondarily reviewed for completeness and accuracy, as evidenced via sign-off on a daily checklist. Reconciling items are researched and resolved in a timely manner in accordance with corporate standards.</td>
<td>For a selection of dates, inspected the daily checklist to determine reconciliations were completed and secondarily reviewed. For a selection of reconciling items, inspected a list of reconciling items for subsequent dates or the adjusting journal entry to determine the items were researched and resolved timely in accordance with corporate standards.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>For IOO ETD, OTC, and CCP settlement instructions provided to external custodians manually via fax, the Derivative Outsourcing Operation Team verifies the settlement details with the clearing broker or counterparty and prepares the payment instruction for the custodian. The instructions are secondarily reviewed as agreed upon with the custodian to help ensure accuracy. For IOO ETD, OTC, and CCP settlement instructions provided to external custodians electronically via a SWIFT message, the SWIFT message is secondarily reviewed to help ensure accuracy prior to release, as systematically required.</td>
<td>For a selection of IOO settlement instructions provided to external custodians manually via fax, inspected the settlement instructions to the clearing broker or counterparty to determine the settlement details were verified and inspected the payment instruction to determine it was secondarily reviewed for accuracy, as agreed upon with the custodian. Observed the system configuration of SWIFT to determine SWIFT was configured to prevent a user from both initiating and approving the same SWIFT message.</td>
</tr>
</tbody>
</table>
TRADE COMMUNICATION AND SETTLEMENT – DERIVATIVES (continued)

Control Objective 6: Controls provide reasonable assurance that derivative transactions are recorded completely, accurately, and in a timely manner (continued).

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<tr>
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<th>Results of Tests Performed</th>
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</thead>
<tbody>
<tr>
<td>7 Prior to release, the Derivatives team secondarily reviews ETD custody settlements for accuracy, as systematically required. For OTC and CCP custody settlements, the Derivatives team compares the settlements details to the investment manager instructions for accuracy, as evidenced by a systematically controlled approval process.</td>
<td>Observed the system configuration to determine the Cash Movement System was configured to require a secondary review for the input of an ETD, OTC, and CCP custody settlement.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

ACTIVE COLLATERAL MANAGEMENT

Control Objective 7: Controls provide reasonable assurance that new collateral management legal agreements are accurately input in the Collateral Management System.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Upon receipt, the terms of the legal agreements (e.g., eligible collateral, thresholds, rates, etc.) are input in the Collateral Management System by an analyst, and the input is independently reviewed for accuracy evidenced via sign-off on the Legal Agreement Setup Checklist.</td>
<td>For a selection of new collateral management accounts legal agreements, inspected the Legal Agreement Setup Checklist to determine the input was independently reviewed and approved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
ACTIVE COLLATERAL MANAGEMENT (continued)

Control Objective 8: Controls provide reasonable assurance that collateral calls and demands are processed accurately.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collateral calls are made based on system-generated calculations. Upon agreement with the counterparty, an analyst inputs the collateral movement into the Collateral Management System. The input is secondarily reviewed for accuracy, as systematically required.</td>
<td>For a selection of collateral calls, recalculated the system-generated calculation to determine the system accurately identified collateral calls. Observed the configuration of the Collateral Management System to determine that it is configured to require a secondary review and to prevent a user from both initiating and approving the same collateral call. Inquired of the Senior Analyst and noted that as part of the secondary review, the collateral movement was reviewed for accuracy to determine that the collateral movement reconciles. For a selection of collateral calls, compared the detail of the collateral call to correspondence from the counterparty to determine the collateral movement reconciled.</td>
<td>No exception noted. No exception noted. No exception noted. No exception noted.</td>
</tr>
<tr>
<td>2. Collateral demands are input into the Collateral Management System based on counterparty requests and are secondarily reviewed for accuracy, as systematically required.</td>
<td>Observed the configuration of the Collateral Management System to determine that it is configured to require a secondary review and to prevent a user from both initiating and approving the same collateral demand.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3. The Collateral team performs reconciliations of open trades and valuations to counterparties, as agreed upon with the client. These reconciliations are performed and secondarily reviewed for accuracy at least monthly. Unreconciled items are researched with the corresponding party and resolved.</td>
<td>For a selection of clients, inspected reconciliations or end of day checklists to determine that the reconciliations were completed and secondarily reviewed. For a selection of unreconciled items, inspected e-mail confirmation to determine that they were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
CASH RECONCILEMENT

Control Objective 9: Controls provide reasonable assurance that cash movement transactions are completely and accurately recorded.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 U.S. cash operating accounts are reconciled to the general ledger on a daily basis to identify teller differences. The teller differences are assigned to the responsible business unit for research and clearance. The reconciliations are signed off on a daily basis.</td>
<td>For a selection of dates, inspected the suspense and reject account reconciliations to determine they were prepared and evidenced via email sign off. For a selection of suspense and reject items, inspected the system Audit Trail which shows the reversing journal entry to the next day's reconciliation to determine the items were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Daily cash reconciliations are performed to help ensure that U.S. cash balances on the Trust System reconcile with the trust demand liability account on the Northern Trust general ledger. Exceptions identified are researched and resolved. The reconciliation is secondarily reviewed for accuracy.</td>
<td>For a selection of dates, inspected the daily cash reconciliation between the Trust System and the trust demand liability account on the Northern Trust general ledger to determine they were performed, exceptions were researched and resolved, and the reconciliation was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Non-U.S. cash accounts held by global subcustodians and banking correspondents are reconciled to Trust System records on a daily basis using an automated reconciliation system. Reconciling items are referred to the relevant operating groups for research and resolution.</td>
<td>For a selection of non-U.S. cash reconciliations, inspected reports to determine that reconciling items were identified, assigned, researched, and resolved. For a selection of non-U.S. cash accounts held by a selection of global subcustodians, independently confirmed the Trust system holdings to the subcustodian's records to determine total holdings reconciled as of August 31, 2017 and February 28, 2018.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
### SECURITIES RECONCILEMENT

**Control Objective 10:** Controls provide reasonable assurance that securities held at third parties (subcustodians, depositories, and mutual fund companies) are completely and accurately recorded to the Trust System.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1 Automated daily balancing of U.S. depositories and mutual fund company matches securities by asset identification number at each depository with Trust System records. Reconciliation exception reports are saved as part of review. Reconciling items are systematically identified and assigned to responsible business units for resolution in a timely manner.</td>
<td>For a selection of custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements. For a selection of reconciling items from daily reconciliations, inspected the system Audit Trail, which reflects when exceptions are assigned to determine that the items were assigned to the responsible business unit for resolution in a timely manner and resolved. For a selection of securities held by a selection of depositories, independently confirmed the Trust System holdings to the depository records to determine total holdings reconciled and the data was not altered as of August 31, 2017 and February 28, 2018. For a selection of mutual fund securities, independently obtained a statement of record from the mutual fund company and compared it to the Trust System to determine that total shares and market value reconciled and the data was not altered as of August 31, 2017 and February 28, 2018.</td>
<td>No exception noted. No exception noted. No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
**SECURITIES RECONCILEMENT (continued)**

**Control Objective 10**: Controls provide reasonable assurance that securities held at third parties (subcustodians, depositories, and mutual fund companies) are completely and accurately recorded to the Trust System (continued).

<table>
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<tr>
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<tbody>
<tr>
<td>2 Assets held by subcustodians are reconciled to the Trust System on a daily basis using an automated reconciliation system, and reconciling items are referred to the relevant operating groups for research and resolution. A summary of the number and age of reconciling items is reported daily to management.</td>
<td>For a selection of custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements. For a selection of reconciling items from daily reconciliations, inspected the system Audit Trail, which reflects when exceptions are assigned to determine reconciling items were assigned to operational areas for resolution in a timely manner and resolved. For a selection of securities held by a selection of subcustodians, independently confirmed the Trust system holdings to the subcustodians’ records to determine total shares reconciled and the data was not altered as of August 31, 2017 and February 28, 2018.</td>
<td>No exception noted. No exception noted. No exception noted.</td>
</tr>
<tr>
<td>3 On a quarterly basis, reconciliation exceptions are reported to the relevant practice executives at the Senior Monthly Risk and Control Meeting by Global Services Control.</td>
<td>For a selection of quarters, inspected global exception volume risk decks to determine they were reported to senior management to review. Inspected risk committee meeting packets to determine exception items were included for discussion.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

*Also see control 14.2.*
### Control Objective 11: Controls provide reasonable assurance that global subcustodian relationships are authorized.

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<tr>
<td>1 The Subcustodian Oversight Committee has approval authority for subcustodian relationships. The Chair of the Subcustodian Oversight Committee has authority to submit to the Capital Markets Credit Committee items of material financial risk for further approval if required.</td>
<td>Compared the current listing of subcustodians to the prior period listing and determined there was one new subcustodian added during the period. For that new subcustodian inspected minutes to determine the Subcustodian Oversight Committee and Capital Markets Credit Committee approved that relationship.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Northern Trust maintains written agreements with subcustodians that identify responsibilities, including registering assets in accordance with market practice. A transition or new market plan is completed for new subcustodians, which includes confirming a signed agreement with the subcustodian is in place.</td>
<td>Compared the current listing of subcustodians to the prior period listing and determined there was one new subcustodian added during the period. For that new subcustodian, inspected the transition or new market plan to determine that the review for the existence of a signed written agreement has been completed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Ongoing service and performance monitoring of subcustodians are performed by staff in Network Management, Credit Risk Management, and Economic Research, including a review to ensure client assets are registered and held in accordance with market practice per authorized subcustodian agreements semiannually. The Subcustodian Oversight Committee reviews this monitoring.</td>
<td>For a selection of subcustodian relationships, inspected that ongoing reviews of the service and performance of subcustodians to determine they were performed and reviewed by the Subcustodian Oversight Committee.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**VAULT SECURITY**

Control Objective 12: Controls provide reasonable assurance that physical securities are safeguarded from loss or misappropriation.

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<tbody>
<tr>
<td>1. Physical securities held at Northern Trust are maintained in fireproof vaults. Physical monitoring devices such as cameras, alarms, and smoke detectors are in place.</td>
<td>Observed that physical securities are maintained in fireproof vaults and that the vaults have security cameras, alarm systems, and smoke detectors.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. Vault access is secured via dual control and updated annually. Employees are assigned separate access combinations to help ensure two individuals are required to access securities maintained in the vault. This access is reviewed annually by management to help ensure it is appropriately restricted.</td>
<td>Observed that the vaults are accessed through a two-part combination with certain individuals maintaining the first half and others the second half. Observed two individuals being present when the vaults are opened and inspected annual access review to determine reviews were completed within the past 12 months to help ensure access is appropriately restricted.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>3. On a quarterly basis, management performs security counts of physical securities maintained in the vaults by reconciling the count to the Trust System or SMAC, and any differences are researched and resolved.</td>
<td>For a selection of quarterly security count reconciliations, inspected security count reconciliation to determine that physical securities were reconciled to the Trust System or SMAC. For a selection of differences, inspected physical security tracking to determine that they were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>

**SECURITIES LENDING**

Control Objective 13: Controls provide reasonable assurance that borrowers and lenders in the securities lending program are authorized, accurately set up on the GSL System, and monitored for adherence to credit limits.

<table>
<thead>
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<tbody>
<tr>
<td>1. The applicable credit committee approves prospective borrowers and borrower credit limits based on a counterparty review process.</td>
<td>For a selection of borrowers, inspected applicable credit committee minutes and review memos to determine credit personnel and the applicable credit committee approved new borrowers. For a selection of weeks, inspected the limit change notification report to determine that any credit limit changes included on the report had been appropriately reflected in GSL.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 13: Controls provide reasonable assurance that borrowers and lenders in the securities lending program are authorized, accurately set up on the GSL System, and monitored for adherence to credit limits (continued).

<table>
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<tbody>
<tr>
<td>2 The GSL System will not accept and process loans for borrowers if they are not approved and active on the system.</td>
<td>Observed a Senior Securities Lending Trader attempt to book a loan for borrowers who were in statuses: prospect; closed; pending; and inactive to determine that the GSL System prevented the user from booking a loan for the inactive borrowers.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 The GSL System will not accept or process new loans for a borrower, if the borrower has reached its preapproved borrowing limit.</td>
<td>Observed the Senior Securities Lending Trader attempt to book a loan for borrowers who had reached the preapproved borrowing limit to determine that the GSL System prevented the user from booking a new loan for the borrower.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4 A securities lending agreement is completed reflecting relevant lending and collateral requirements. A Securities Lending Account Manager enters agreement information into an input sheet, which is reviewed and electronically signed off by a second account manager prior to delivery to Securities Lending Operations. Securities Lending Operations enters new client information to the GSL System, from input sheets that reflect the relevant contractual agreements. Securities Lending Operations performs a next day review of the audit trail report, which details the setup or amendment of borrowers and clients processed on the prior business day, to help ensure accuracy of the inputs.</td>
<td>For a selection of new clients, inspected input sheets to determine that they were reviewed by a second account manager as evidenced by an electronic sign-off. For a selection of days, inspected audit trail reports for evidence of review and follow-up to determine that they were reviewed by Securities Lending Operations.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>5 Securities Lending Operations reviews GSL System reports daily to identify instances where shares on loan exceed securities available for lending or securities loaned. Identified exceptions are forwarded to the Securities Lending trade support team to investigate.</td>
<td>For a selection of dates, inspected the exception reports for evidence of review and follow-up to determine that they were reviewed by Securities Lending Operations.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
SECURITIES LENDING (continued)

Control Objective 14: Controls provide reasonable assurance that securities lending transactions and loan processing are recorded accurately.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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<tbody>
<tr>
<td>1 Securities Lending Operations Chicago completes a daily reconciliation of U.S. cash activity between the depositories and the GSL System. Reconciling items are identified by Securities Lending Operations personnel in a timely manner and exceptions are booked to internal suspense accounts, which are used to age and monitor exceptions until they are cleared.</td>
<td>For a selection of days, inspected daily reconciliations to determine they were completed. Inspected a selection of exceptions to determine they were booked to internal suspense accounts, aged, and monitored until cleared.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Non-U.S. cash balances are automatically reconciled between subcustodians and banking correspondents and the Trust System, generating exception reports. Securities lending-related exceptions are assigned to Securities Lending Operations London for corrective action as required. Open items are aged and monitored until resolved.</td>
<td>For a selection of custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements to identify differences between the Trust System and the subcustodian. For a selection of exceptions, inspected e-mail communications and system screen prints showing reclassification to determine the exceptions were assigned, researched, aged and monitored until resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Security positions are automatically reconciled between the Trust System and the related depository, generating exception reports. Securities lending-related differences are assigned to Securities Lending Operations for research and corrective action as required. Open items are aged and monitored until resolved.</td>
<td>For a selection of custody and fund services accounts, inspected the pass rules supporting the automated reconciliations to determine that the pass rules are configured per business requirements to identify differences between the Trust System and the depositories. For a selection of days, inspected security position reconciliations to determine the exception reports were generated. Inspected a selection of exceptions to determine that they were assigned and researched.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
SECURITIES LENDING (continued)

Control Objective 15: Controls provide reasonable assurance that securities lending collateral balances are accurately recorded on the GSL System, monitored for adequacy, and for cash collateral, are invested within the guidelines of the governing agreement.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1 The Securities Lending Operations Group generates the End of Day borrower collateralization report that highlights instances where borrowers were below collateral threshold levels at the end of the previous day. The report contains explanatory narratives provided by Securities Lending collateral desk supervisors. This report is distributed to Securities Lending Operations management to help ensure exceptions are being suitably addressed.</td>
<td>For a selection of days, inspected the End of Day borrower collateralization Report to determine that the Securities Lending Operations Group distributed the report to Securities Lending Operations management containing narratives supporting instances where borrowers fell below collateral threshold levels.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 The Asset Management Guideline Monitoring team reviews compliance with hardcoded investment guidelines on a daily basis. As needed, the Asset Management Guideline Monitoring team will use the Portfolio Management System to inquire with the portfolio manager about exceptions. The portfolio manager’s response is delivered to the Asset Management Guideline Monitoring team and archived within the Portfolio Management System.</td>
<td>For a selection of days, inspected the investment guideline exception reports to determine that they were generated. For a selection of exceptions from the investment guideline report, inspected Portfolio Management System documentation to determine the exceptions were researched, monitored, and cleared.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Annually, the Short Duration Fixed Income team performs account reviews to monitor portfolio construction relative to investment guidelines. The Portfolio Manager reviews the compliance rules assigned to the account at the time of the review to check for consistency against the investment guidelines.</td>
<td>For a selection of accounts, inspected account review documentation to determine an account review, including a review of investment guidelines, was completed at least annually.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
SECURITIES LENDING (continued)

Control Objective 16: Controls provide reasonable assurance that securities lending income is posted to client accounts accurately and completely on a monthly basis.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1 The Securities Lending Operations Group prepares a monthly income statement reconciliation that reflects cash collateral earnings from Fund Accounting, including monthly adjustments related to timing differences between loan activity recorded on the Fund Accounting System and the GSL System. Differences are actioned as necessary in accordance with business unit procedures.</td>
<td>For a selection of months, inspected the monthly income statement reconciliation to determine it was completed, secondarily reviewed, and differences were researched and actioned in accordance with business unit procedures.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

BENEFIT PAYMENTS

Control Objective 17: Controls provide reasonable assurance that benefit payments are authorized and recorded completely and accurately on the Benefit Payment System and Trust System.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1 For conversions from a prior payer, benefit payments perform a parallel run of payments prior to actual payment production. The parallel run report is provided to the client for their review and approval prior to commencement of payments.</td>
<td>For a selection of new clients, inspected sign-off letters and signature cards/delegation agreements to determine that the client received and approved the parallel run report prior to commencement of payments.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Benefit Payments reviews change request instructions (e.g., EFT/ACH, address, participant status, and name) and benefit payment instructions for lump-sum or periodic payments received manually from clients or recordkeepers for indication they are from a client-authorized party.</td>
<td>For a selection of manual instructions, inspected the instruction or document imaging system for evidence the instruction was reviewed by Benefits Payments to determine it was from an authorized party.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Benefit Payments reviews manual payment instructions for completeness prior to processing. Missing or unclear information is obtained from the client. The instructions are manually input on the Benefit Payment System and secondarily reviewed, as systematically required by the Benefit Payment System.</td>
<td>Observed the input of a manual payment to determine that the Benefit Payment System required the input to be approved by a second individual.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4 The client or recordkeeper verifies and approves benefit payment transmissions setup on the Benefit Payment System to help ensure requests transmit accurately. Once an electronic transmission is approved, the file is processed by the Benefit Payment System.</td>
<td>For a selection of processed electronic transmissions, inspected the Benefit Payment System or transmission records to determine the transmission was approved by the client or recordkeeper.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
BENEFIT PAYMENTS (continued)

Control Objective 17: Controls provide reasonable assurance that benefit payments are authorized and recorded completely and accurately on the Benefit Payment System and Trust System (continued).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>In the United States, on a daily basis, the Benefit Payment System is reconciled to the Trust System at an omnibus level. Differences are researched and resolved.</td>
<td>In the United States, for a selection of dates, inspected the automated reconciliations to determine the system is configured to identify differences. Additionally, for a selection of differences, inspected account transactions and reclassifications to determine they were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>In Canada, on a monthly basis, a reconciliation between the Trust System, Benefit Payment System, and Paying Agent records is performed. Differences are researched and resolved.</td>
<td>In Canada, for a selection of dates, inspected the manual reconciliations to determine transactions between the Trust System, Benefit Payment System, and Paying Agent records reconciled. Additionally, for a selection of differences, inspected account transactions and reclassifications to determine they were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

ASSET CODING AND VALUATION

Control Objective 18: Controls provide reasonable assurance that new securities and changes to securities are authorized and established in a complete, accurate, and timely manner.

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<tbody>
<tr>
<td>The security master file requires critical data elements that are required to be populated prior to allowing activation on the system. The Asset Coding System prompts for missing information and does not allow for an asset to be saved without critical data provided.</td>
<td>Observed the Asset Coding System prompts for missing critical data elements prior to asset activation to determine the system does not allow for an asset to be saved without critical data provided.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**ASSET CODING AND VALUATION (continued)**

**Control Objective 18:** Controls provide reasonable assurance that new securities and changes to securities are authorized and established in a complete, accurate, and timely manner (continued).

<table>
<thead>
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<tbody>
<tr>
<td><strong>2</strong> Non-derivative manual asset setups and modifications are made by the Asset Coding team to the security master file based on an authorized source and in a timely manner. Manual asset setups and modifications are generated daily. Secondary reviews are performed, as dictated by business unit procedures, to ensure accuracy of the asset details. For derivative assets, manual asset setups and modifications to the security master file are made by the Derivatives Coding team in a timely manner. Manual asset setups and modifications are secondarily reviewed by an individual independent of the input to ensure accuracy of the asset details.</td>
<td>For a selection of manual asset setups and modifications, inspected exceptions or asset setup requests or confirmations to determine that the setup was performed by settlement date or the modification was performed within five days. Inspected that the manual setup or modification was authorized. Inspected that the manual setup was secondarily reviewed, in accordance with business unit procedures. Inspected that the modification was secondarily reviewed for those in training, in accordance with business unit procedures.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>3</strong> The Asset Coding team reviews exceptions to identify omissions or errors in indicative data fields of assets. The exceptions are researched and resolved in a timely manner.</td>
<td>For a selection of dates and exceptions, inspected the asset coding application to evaluate that exceptions had been researched and resolved within five business days or by payable date.</td>
<td>No exception noted.</td>
</tr>
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</table>

**Control Objective 19:** Controls provide reasonable assurance that security prices are processed completely, accurately, and timely.

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<tr>
<td><strong>1</strong> The Pricing System assigns prices against defined parameters at established times throughout the day. Variances that do not fall within defined parameters or assets with missing prices appear in the Pricing System error queue or are on exception reports. The items in the error queue or on the exception reports are researched and resolved by the next business day.</td>
<td>For a selection of dates and exception items, inspected error queues and exception reports for evidence of review and follow-up to determine that exception items were researched and resolved by the next business day.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**ASSET CODING AND VALUATION (continued)**

**Control Objective 19:** Controls provide reasonable assurance that security prices are processed completely, accurately, and timely (continued).

<table>
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<tr>
<td>2. Prices manually entered into the Pricing System are systematically required to be secondarily reviewed and approved prior to upload into the system.</td>
<td>Observed the manual input of a price to determine that the Pricing System systematically required manually input prices to be approved by a second individual.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3. For hard-to-price securities that are manually priced (e.g., hedge funds, limited partnership, and commingled funds), team members agree the third-party valuation statements and/or third-party pricing to the Trust System at established time frames. Differences are researched and resolved.</td>
<td>For a selection of months and a selection of hard-to-price, manually priced securities, inspected the fund valuation status summary and third-party statement to determine that team members agreed the market values and/or net asset values (NAVs) between the Trust System and the third-party valuation statement received. Inspected the fund valuation status summary to determine that differences were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4. Price challenges are researched through independent pricing vendors or other sources and prices are changed in the Pricing System, if deemed appropriate per business unit procedures. Manual changes required are secondarily reviewed for accuracy, as systematically required.</td>
<td>For a selection of price challenges, inspected case status screen to determine that the price had been researched and affirmed or changed. Observed the manual input of a price to determine that the Pricing System required manually input prices to be approved by a second individual.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>5. Jobs are configured to compare header and trailer records of the pricing files received from the vendor to help ensure the pricing feeds are complete and accurate. Duplicate files or files with missing criteria are prevented from entering the Pricing System.</td>
<td>For a selection of pricing files received, inspected the jobs to determine that error criteria were configured to amend jobs if there was not a valid header and trailer record or if a duplicate file was received.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**CORPORATE ACTIONS**

**Control Objective 20:** Controls provide reasonable assurance that corporate action events are communicated to clients, and where applicable, election responses are received in a timely manner and all resulting entitlements are accurately recorded and posted to client accounts in a timely manner.

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<td>1 Announcements are received from independent vendors, subcustodians, or registrars, and input to the Corporate Actions System. Announcements are independently reviewed for accuracy and completeness and transmitted to notify clients, fund managers, and internal business units through the Corporate Actions System.</td>
<td>For a selection of corporate actions, inspected the Corporate Actions System to determine that announcements were independently reviewed and transmitted to clients.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Upon receipt of completed decisions from clients, fund managers, and internal business units, a message is prepared to direct the depository, subcustodian, or registrar to process the elections of the security holders involved in the corporate actions. These messages, including the completeness of decisions, are independently reviewed by a Corporate Actions team member for accuracy and completeness prior to transmission, and transmitted to the agent by the response deadline.</td>
<td>For a selection of voluntary corporate action events, inspected client responses and the Corporate Action System to determine that the responses were independently reviewed by a Corporate Actions team member for completeness and accuracy and transmitted to the agent prior to the response deadline.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Entitlements received from the depositaries and paying agents are deposited into a clearing account and reviewed in the payment system or via a checklist when performed manually to help ensure that the entitlement received is as expected.</td>
<td>For a selection of mandatory and voluntary actions, inspected payment printout with TL/Manager sign-off evidencing secondary review of entitlement. For cases where the process is manual, the approved checklist was reviewed to determine they were received as expected.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4 Discrepancies of entitlement amounts between the clearing account and Trust System are identified on reconciliation reports, investigated, and outstanding discrepancies are reported to management monthly.</td>
<td>For a selection of discrepancies, inspected applications, e-mail communications and account corrections to determine that the entitlement discrepancies were investigated and resolved. For a selection of months, inspected risk committee meeting packets to determine exception items were included for discussion.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
### INCOME COLLECTIONS

**Control Objective 21:** Controls provide reasonable assurance that income is completely and accurately recorded and posted to client accounts in a timely manner.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Declared income distribution data is received from outside vendors and depositories and compared with asset holdings on the Trust System to create anticipated income maps. On or before payable date, analysts review exception reports that identify differences between income maps and pre-advices of income amounts or actual income received. Unmatched items are researched and resolved via adjustments to income maps or manual postings to the Trust System. Income posted manually is secondarily reviewed for accuracy as systematically required. Security income identified on income maps and due from (contractual markets) or an exact match of income received from (noncontractual markets) is automatically posted to client accounts.</td>
<td>For a selection of unmatched items, inspected the compare report as well as entries recorded to cancel and rebook to determine the items were researched and resolved on or before payable date. Observed the configuration of the Trust System to determine that it is configured to prevent a user from both initiating and approving the same transaction.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. The day after payable date, income received is reconciled to income paid, resulting in control reports with reconciling items. Reconciling items are researched and resolved.</td>
<td>For a selection of reconciling items, inspected e-mail communications, screen cancellations, payment corrections, and credits processed to determine the item was researched and resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

### TAX WITHHOLDING AND RECLAMATION

**Control Objective 22:** Controls provide reasonable assurance that tax receivables and withholdings are completely and accurately recorded and posted to the appropriate client account.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Tax receivables are tracked and monitored against established standards in the Trust System to help ensure claims are filed and processed within country guidelines. Reports summarizing the status of open items are produced and distributed to management weekly/monthly.</td>
<td>For a selection of open claims, inspected the Trust System to determine that open claims were being tracked and monitored.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. On a monthly basis, management is provided reporting with the status of tax documentation, including outstanding documentation for claiming tax relief at source and tax reclaims. Relationship management is notified to investigate and resolve the outstanding documentation.</td>
<td>For a selection of outstanding tax documents, inspected tax documentation status reporting to determine that the missing documentation was identified and the relationship manager had been notified for resolution.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
### TAX WITHHOLDING AND RECLAMATION (continued)

**Control Objective 22:** Controls provide reasonable assurance that tax receivables and withholdings are completely and accurately recorded and posted to the appropriate client account (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
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</thead>
<tbody>
<tr>
<td>3 On an annual basis, tax questionnaires are sent by the Tax Group to Northern Trust's subcustodian agent banks to verify the tax rates for the particular market. The questionnaire results are compared to the rates in Trust System and differences are researched and resolved.</td>
<td>For a selection of tax questionnaires, inspected the questionnaire and the Trust System to determine that the questionnaire results were reconciled to the rates in the Trust System and differences had been researched and resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

**Control Objective 23:** Controls provide reasonable assurance that nonresident alien tax withholdings are completely and accurately recorded, posted to the appropriate client account, and credited to the IRS.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Foreign accounts holding U.S. securities are monitored by the NRA Tax Group to help ensure the amount withheld agrees with taxation regulations. The NRA Tax Group uses a withholding module that automatically calculates the correct withholding percentage to apply for each account based on W-8 information that is input to the Trust System. The NRA Tax Group reviews accounts to help ensure that the withholding is accurate based upon W-8 validations. Discrepancies are researched and resolved.</td>
<td>For a selection of accounts, inspected the W-8 and traced it into the Trust System withholding module to determine that the tax withholding amounts were completely and accurately coded in the system by the NRA Tax Group.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 On an annual basis, the withholdings in each client's account is reconciled to the withholdings in the internal escrow account. The withholdings in the internal escrow account are then reconciled to the transcript of the tax deposits made to the U.S. Treasury. Differences are researched and tracked until resolved.</td>
<td>Inspected the annual reconciliation to determine that it was prepared by the Tax team Leader, differences were researched and resolved and it was reviewed by the Tax Manager.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
## CLIENT AND PERFORMANCE REPORTING

**Control Objective 24:** Controls provide reasonable assurance that account statements reflecting cash and security positions are complete, accurate, and made available in a timely manner.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. Analysts complete an analytical review of client reports for reasonableness using a checklist to help ensure necessary review steps are completed. Identified exceptions are routed to the originating area for research and resolution.</td>
<td>For a selection of clients, inspected reports and checklists to determine that analytical reviews were performed and identified exceptions were resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. Prior to distribution of unitization reporting to the client, transactions posted to the Units and Plan Valuation Tool are reconciled to transactions provided by Client Servicing, and identified differences are researched and resolved. The reconciliation is secondarily reviewed for accuracy, as evidenced via sign-off on the unitization checklist.</td>
<td>For a selection of unit valuation clients, inspected the unitization checklist to determine the reconciliation was performed, identified differences were researched and resolved, and the reconciliation was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3. Prior to distribution of allocation reporting to the client, analysts utilize an allocation checklist to perform a final review of plan activity to help ensure allocation-based reporting is complete and accurate. The reporting is secondarily reviewed, as evidenced via sign-off on the allocation checklist.</td>
<td>For a selection of allocation clients, inspected the allocation checklist to determine that plan activity was reviewed for accuracy and completeness and the report was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4. Client statements are made available to clients in their chosen media in a timely manner.</td>
<td>For a selection of clients, inspected online approvals to determine that statements were made available to the client within five business days of finalization of the data.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>5. For clients requesting the Manager Sign-off Reconciliation Service, the Reconciliation team reviews variances between the market value of the IM and Northern Trust records at a portfolio level. Variances that exceed the client agreed tolerances are researched and resolved or the Northern Trust data is confirmed accurate. The Reconciliations team signs off on accounts within the client-agreed tolerances. If the overall portfolio value variance is outside of the client-agreed tolerance and the Northern Trust account data was confirmed to be accurate, the Reconciliations team signs off on the account and includes the rationale for the remaining variance in the sign-off e-mail (so that barring those differences, the account will be within the client's tolerance).</td>
<td>For a selection of accounts, inspected the sign-off e-mail and client threshold to determine the account was signed off and rationale was included in the e-mail if the overall portfolio value was outside of the threshold.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
## CLIENT AND PERFORMANCE REPORTING (continued)

### Control Objective 25: Controls provide reasonable assurance that IRAS Performance, Private Monitor, and Risk reporting is accurate.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>1</strong> For IRAS Performance and Private Monitor clients, IRAS reviews confirmations from Client Accounting and Reporting indicating that the portfolio data has been reviewed and completed.</td>
<td>For a selection of periodic Performance and Private Monitor analyses, inspected the confirmation from Client Accounting and Reporting to determine that they communicated their completed review of the portfolio data.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> For IRAS Performance and Private Monitor clients, performance data is analyzed to help ensure calculations of returns are reasonable at the account and consolidated level for each client, and client-specific requirements are also performed to determine the reasonability of the rate of return calculations. Reasonability issues identified during the review are researched and resolved or directed to the appropriate party for resolution.</td>
<td>For a selection of periodic Performance and Private Monitor analyses, inspected the performance analysis and client-specific procedures/checklists to determine the rate of return was reviewed for reasonability and the necessary client-specific steps were completed. Inspected a sample of exceptions to determine that they were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>3</strong> For IRAS Risk Reporting clients, IRAS analyzes risk reporting data to ensure risk metrics are reasonable at the account and consolidated level to identify reasonability issues. The risk reporting data is secondarily reviewed as evidenced on the client checklist.</td>
<td>For a selection of Risk Reporting clients, inspected the client checklist to determine the risk reporting data was reviewed for reasonability and secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

### Control Objective 26: Controls provide reasonable assurance that investment guidelines are set up accurately on the Compliance Analyst System and violations of the guidelines are reported to the client.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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<th>Results of Tests Performed</th>
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<tbody>
<tr>
<td><strong>1</strong> The Compliance Consultant inputs the client's investment guidelines into the Compliance Analyst System. System testing is performed to help ensure the Compliance Analyst System is triggering violations when necessary. The system testing results in a proof package. The Compliance Consultant inputs the client's investment guidelines into the Compliance Analyst System and accuracy of investment guideline setup is verified through secondary review.</td>
<td>For a selection of new NA and APAC clients, inspected the investment guideline testing proof package to determine the guidelines were tested in the Compliance Analyst System.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> For a selection of new EMEA clients, inspected e-mail communications issued to determine the investment guideline input was secondarily reviewed.</td>
<td></td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
CLIENT AND PERFORMANCE REPORTING (continued)

Control Objective 26: Controls provide reasonable assurance that investment guidelines are set up accurately on the Compliance Analyst System and violations of the guidelines are reported to the client (continued).

<table>
<thead>
<tr>
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<th>Testing Performed by KPMG LLP</th>
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<tbody>
<tr>
<td>2 The Compliance Analyst System generates investment guideline violation exception reports, and IRAS provides the reports to the clients.</td>
<td>For a selection of dates, inspected correspondence sent to the clients to determine that investment guideline violation reports were distributed to the client.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

INVESTMENT ACCOUNTING AND REPORTING

Control Objective 27: Controls provide reasonable assurance that month-end investment accounting and reporting data is complete, accurate, and prepared in a timely manner.

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>1 Cash Receipt and Disbursement Activity per the Investment Accounting and Reporting System are reconciled to the Trust System daily and/or monthly (depending on client SLA) and the reconciliations are secondarily reviewed to help ensure accuracy. Reconciling items are identified, researched, and resolved.</td>
<td>For a selection of months, inspected reconciliations to determine they were completed and independently reviewed. For a selection of reconciling items, inspected the reconciliation in subsequent dates and the final adjusted balance to determine the items were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>2 Asset quantity balances per the Investment Accounting and Reporting system are reconciled daily and/or monthly (depending on client SLA) basis to the asset quantity balances to the Trust System records using reconciliation functionality in the Investment Accounting and Reporting system. Reconciling items are researched and resolved. Reconciliation are secondarily reviewed to help ensure accuracy.</td>
<td>For a selection of months, inspected reconciliations to determine they were completed and secondarily reviewed. For a selection of reconciling items, inspected the reconciliation in subsequent dates and the final adjusted balance to determine the items were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 27: Controls provide reasonable assurance that month-end investment accounting and reporting data is complete, accurate, and prepared in a timely manner (continued).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>3 Asset Market values per the Investment Accounting and Reporting system are reconciled daily and/or monthly (depending on client SLA) to the asset market values to the Trust System records using reconciliation functionality in the Investment Accounting and Reporting system. Reconciling items are researched and resolved. Reconciliations are secondarily reviewed to help ensure accuracy.</td>
<td>For a selection of months, inspected reconciliations to determine they were completed and secondarily reviewed. For a selection of reconciling items, inspected the reconciliation in sequent dates and the final adjusted balance to determine the items were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>4 Income Accrual values per the Investment Accounting and Reporting system are reconciled daily and/or monthly (depending on client SLA) to the income accrual values to the Trust System records using reconciliation functionality in the Investment Accounting and Reporting system. Reconciling items are researched and resolved. Reconciliations are secondarily reviewed to help ensure accuracy.</td>
<td>For a selection of months, inspected reconciliations to determine they were completed and secondarily reviewed. For a selection of reconciling items, inspected the reconciliation in sequent dates to determine the items were researched and resolved.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>5 The Investment Accounting and Reporting System calculates income accruals based upon holdings and security master data and/or market sourced corporate action data (dividends).</td>
<td>For a selection of months and securities, recalculated the income accrual to determine it reconciled with the Investment Accounting and Reporting System.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>6 The Investment Accounting and Reporting System calculates unrealized gains and losses based on the asset market value and the amortized cost of the position.</td>
<td>For a selection of months, inspected unrealized gains and losses to determine it reconciled with the Investment Accounting and Reporting System.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>7 The Investment Accounting and Reporting System calculates realized gains and losses based on the trade proceeds and the amortized cost of the accounting lot.</td>
<td>For a selection of months, inspected realized gains and losses to determine it reconciles with the Investment Accounting and Reporting System.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>8 The Investment Accounting and Reporting System calculates amortization and accretion based upon client specific configuration, security master, and transaction/holding data.</td>
<td>For a selection of months and securities, inspected amortization and accretion to determine the method is consistent with client configuration, security master, and transaction/holding data. In addition, recalculated the amount and agreed to the Investment Accounting and Reporting System amount.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
INVESTMENT ACCOUNTING AND REPORTING (continued)

Control Objective 27: Controls provide reasonable assurance that month-end investment accounting and reporting data is complete, accurate, and prepared in a timely manner (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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</thead>
<tbody>
<tr>
<td>9 Accounting journal entries are generated by the Investment Accounting and Reporting System. Information is consolidated into one file, which documents entries for the client to post to their general ledger and the file is secondarily reviewed.</td>
<td>For a selection of monthly accounting journal entries, inspected e-mail communication to determine that the entries were secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>10 The client is notified in a timely manner that accounting and reporting deliverables are available for download via the Investment Accounting and Reporting Services Web portal or reports will be e-mailed directly to the client.</td>
<td>For a selection of clients, inspected e-mails or mail logs to determine that notification was sent to the client in a timely manner.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

UNITIZED VALUATION AND REPORTING SERVICES

Control Objective 28: Controls provide reasonable assurance that participant-directed information received from the recordkeeper is posted accurately to the Fund Accounting System.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Daily Valuation (DV) Operations receives electronic transmissions of participant-directed information daily from the majority of recordkeepers, which post overnight to the Trust System that directly interfaces with the Fund Accounting System. Error/rejected activity is automatically sent to DV Operations via e-mail. DV Operations compiles the daily errors/rejects and sends them to UVRS. UVRS researches the errors/rejects and assigns them to the responsible business unit for resolution if necessary.</td>
<td>For a selection of exceptions/rejects, inspected e-mail communications automatically sent to DV Operations as well as directed transfers processed to determine that they were researched and resolved, if applicable.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 For participant-directed information processed manually (e.g., loan repayments and direct rollovers), DVOPS analysts input the information into the Cash Movement System per the letter of direction received from the Front Office or UVRS. The input is secondarily reviewed for accuracy, as systematically required by the Cash Movement System.</td>
<td>Observed the input of an outgoing cash transaction to determine that the Cash Movement System required the transaction to be approved by a second individual.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
## UNITIZED VALUATION AND REPORTING SERVICES (continued)

**Control Objective 29:** Controls provide reasonable assurance that the NAV calculation is accurate on the Fund Accounting System.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Transactions and positions (including participant units, income accruals and payments, expense accruals, realized gain/loss, and settlement transactions) are automatically reconciled between the Trust System and Fund Accounting System daily, generating exception reports. Analysts research and resolve the exception items on the exception reports.</td>
<td>For a selection of dates and clients, inspected exception reports to determine that exceptions were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> Analysts compile a NAV calculation package to support the NAV calculation, and valuation exceptions are researched and resolved. Analysts utilize a NAV valuation checklist to help ensure the accuracy of the calculation. The NAV calculation package is secondarily reviewed online, as evidenced on the NAV Status Report.</td>
<td>For a selection of dates and clients, inspected the NAV calculation package to determine that valuation exceptions were researched and resolved and the checklist was completed. Inspected the NAV Status Report to determine the NAV calculation was independently reviewed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

## FUND ACCOUNTING

**Control Objective 30:** Controls provide reasonable assurance that portfolio transactions are processed accurately and completely on the Fund Accounting System.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>1</strong> Portfolio investment transactions are recorded on the Fund Accounting System. Transaction bookings are verified through reconciliation or review of EMS or various reports. Exceptions are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets to determine that portfolio investment transactions were recorded accurately and exceptions were researched or resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> Portfolio security positions held on the Fund Accounting System are reconciled to the positions reported by the custodian or applicable third parties. Exceptions are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets to determine that portfolio security positions per the Fund Accounting System were reconciled to the custodian or applicable third parties and exceptions were researched or resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>3</strong> Fund Accounting corporate action specialists review corporate action activity to help ensure that mandatory and voluntary corporate action events are recorded accurately in the Fund Accounting System. Exception items are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets or online corporate action repositories to determine that corporate action-related exceptions were researched or resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
FUND ACCOUNTING (continued)

Control Objective 30: Controls provide reasonable assurance that portfolio transactions are processed accurately and completely on the Fund Accounting System (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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<tbody>
<tr>
<td>4 For applicable share class hedged funds, Fund Accounting process FX transactions at the class level as instructed and reconcile FX positions at a fund level. Exceptions are researched and resolved.</td>
<td>For a selection of applicable funds and dates, inspected the valuation packet to determine that any new Class Hedging FX transactions were processed at class level accurately.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>5 For Tax Transparent Funds excluding those using the NT R3 module, Fund Accounting reconciles portfolio security positions between the portfolio accounting and share class levels. The reconciliation of security positions is inclusive of securities split per percentage ownership as of trade date and class/investor account rebalancing to reflect the new ownership allocations (resulting from subscription/redemption activity or income received). Exception items are researched or resolved.</td>
<td>For a selection of Tax Transparent funds and dates, inspected portfolio to share class reconciliation exception reports and valuation checklists to determine that the reports were reviewed and exceptions were researched or resolved by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

Control Objective 31: Controls provide reasonable assurance that investor transactions are recorded accurately for each valuation date on the Fund Accounting System.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1 Fund Accounting reflects the total investor activity and reconciles the ending balances to the transfer agent. Differences are researched or resolved.</td>
<td>For a selection of funds and dates, inspected the valuation packets to determine that transfer agent data received by Fund Accounting was accurately recorded, that investor activity and ending balances per the Fund Accounting System were reconciled to the fund’s transfer agent, and that differences were researched or resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

Control Objective 32: Controls provide reasonable assurance that investment income and expenses are accurately recorded.

<table>
<thead>
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<tbody>
<tr>
<td>1 Fund Accounting reviews income accruals on the Fund Accounting System. Income variances defined by thresholds are identified through EMS, other tools, or reconciliations and the variances are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets to determine that income accruals exceeding specified thresholds were researched or resolved by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**FUND ACCOUNTING (continued)**

**Control Objective 32:** Controls provide reasonable assurance that investment income, and expenses are accurately recorded (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2 Fund Accounting processes changes to expense accruals as directed. Expense accrual variances impacting the NAV are identified through EMS and are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets and checklists to determine that fee and expense accrual variances exceeding specified thresholds were researched or resolved by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

**Control Objective 33:** Controls provide reasonable assurance that market valuations are accurately reflected on the Fund Accounting System.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>See additional controls under Asset Coding and Valuation, control objectives 18 and 19.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Fund Accounting reviews security price movements that impact the NAV through EMS for vendor-provided pricing or utilizing other tools. Exceptions are researched to help ensure prices are valid.</td>
<td>For a selection of funds and dates, inspected the valuation packets to determine that price exceptions were reviewed and exceptions impacting the NAV were researched or resolved by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

**Control Objective 34:** Controls provide reasonable assurance that cash balances are accurate on the Fund Accounting System.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Cash balances held on the Fund Accounting System are reconciled to the balances reported by the custodian or applicable third parties. Exceptions are researched or resolved.</td>
<td>For a selection of funds and dates, inspected valuation packets to determine that cash balances per the Fund Accounting System were reconciled to the custodian or applicable third parties and exceptions were researched or resolved by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

**Control Objective 35:** Controls provide reasonable assurance that NAV calculations are complete and accurate.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1 The Fund Accounting System automatically calculates the NAV. Fund Accounting compiles a valuation packet to support the NAV calculation, and each process is evidenced by the preparer and reviewer on the valuation checklist.</td>
<td>For a selection of funds and dates, inspected the valuation packet to determine that the NAV calculation checklist was completed by the preparer and the packet was secondarily reviewed by Fund Accounting.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
FUND ACCOUNTING (continued)

Control Objective 35: Controls provide reasonable assurance that NAV calculations are complete and accurate (continued).

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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<tbody>
<tr>
<td>2 For applicable funds, Fund Accounting monitors the share class performance through review of divergence reporting or exception reporting on valuation date. These checks compare the NAV movement is in line with the classes. Fund Accounting reviews divergences for reasonableness.</td>
<td>For a selection of applicable funds and dates, inspected the valuation packet and checklist to determine that divergences were reviewed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

TRANSFER AGENCY

Control Objective 36: Controls provide reasonable assurance that new shareholder accounts and updates to shareholder registers are authorized and accurate.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A Transfer Agency analyst inputs new account applications for direct shareholders into the Share Registration System, and the input is secondarily reviewed for completeness and accuracy.</td>
<td>For a selection of new accounts, inspected the account application, checklist, Share Registration System, or the workflow to determine the input was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 For register updates requiring manual processing, a Transfer Agency analyst reviews requests for maintenance to the shareholder register for direct investor authorization and inputs them into the Share Registration System. Direct investor requests are secondarily reviewed for accuracy and completeness.</td>
<td>For a selection of maintenance requests, inspected electronic sign-offs in the Transfer Agency Workflow System for evidence that the request was reviewed to determine it was from an authorized party and direct investor requests were secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 In the United States, certain share register updates may be requested via telephone. Share register updates accepted via telephone are received on recorded telephone lines. A Transfer Agency staff member validates the caller’s identity through the use of security questions and verifies that the share register update is permitted to be initiated via the telephone. Transactions are read back to the caller for validation and quality control.</td>
<td>For a selection of share register updates accepted via telephone, listened to the recorded telephone line to determine that the call was verified in accordance with business unit procedures.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4 For traditional and unitized funds, when an address change is made, a confirmation is sent electronically, via fax, or by mail, to investors by Transfer Agency or a third-party vendor. Where the confirmation is sent via post, this is mailed to both the old and new address.</td>
<td>For a selection of address changes, inspected confirmation statements or system logs to determine address change confirmations were sent to investors.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
TRANSFER AGENCY (continued)

Control Objective 37: Controls provide reasonable assurance that shareholder subscriptions, redemptions, and payments are received from authorized sources and accurately entered into the Share Registration System.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. A Transfer Agency analyst reviews investment and redemption requests and related payment instructions received in the Transfer Agency's workflow system to provide assurance that the instructions are received from an investor authorized party per the authorized signer list, or that the information required is consistent with the investor data on file. Northern Trust remits redemption proceeds received as specified on the subscription application form, subsequent correspondence from the investor, or redemption letter.</td>
<td>For a selection of investment and redemption requests, inspected sign-off on the physical instruction/checklist or electronic partner sign-offs in the Transfer Agency Workflow System for evidence the Transfer Agency analyst reviewed the transaction to determine it was from an authorized party.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2. A Transfer Agency analyst reviews share register transactions for accuracy, evidenced by sign-off on the dealing packs/checklists or electronically in the workflow/Share Registration System.</td>
<td>For a selection of share register transactions, inspected the Share Register System, the dealing pack/checklist, or workflow/Share Registration System to determine that the transactions were secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3. Certain share register transactions may be requested via telephone. Transactions accepted via telephone are received on recorded telephone lines. A Transfer Agency staff member validates the caller’s identity through the use of security questions and verifies that the transaction is permitted to be initiated via the telephone. Transactions are read back to the caller for validation and quality control.</td>
<td>For a selection of transactions accepted via telephone, listened to the recorded telephone line to determine that the call was verified in accordance with business unit procedures.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4. For traditional and unitized funds, standard procedures for redemptions include systematic checks of remaining unit/capital balance to help ensure that more units/capital is not sold than is owned. The Share Registration System automatically triggers a warning of insufficient funds should a member of the Transfer Agency Department attempt to redeem units that did not exist at that date.</td>
<td>Inspected the Share Registration System to determine that a redemption that exceeded funds available was rejected by the system.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
## Controls Specified by Northern Trust

### Control Objective 37:

Controls provide reasonable assurance that shareholder subscriptions, redemptions, and payments are received from authorized sources and accurately entered into the Share Registration System (continued).

<table>
<thead>
<tr>
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<th>Testing Performed by KPMG LLP</th>
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<tbody>
<tr>
<td>5. The Share Registration System receives pricing files with NAVs of investment and redemption transactions in Transfer Agency accounts from the Fund Accounting System. The Transfer Agency Department manually loads pricing to the Share Registration System for a minimal amount of prices in the United Kingdom, Ireland, Guernsey, and Luxembourg, and a minimal amount of dividend factors in the United States. Manually loaded prices are independently verified within the Share Registration System to help ensure accuracy. In the United States, manually loaded dividend factors are independently reviewed periodically to help ensure accuracy.</td>
<td>In Ireland, Guernsey, and Luxembourg, observed the manual input of the price into the Share Registration system to determine that the system prevented a user from both inputting and approving the same manually input price. In the United Kingdom, for a selection of dates, inspected the daily log to determine that manually loaded prices were independently reviewed. In the United States, for a selection of manually loaded dividend factors, inspected the Share Registration System or supporting documentation to determine the manually loaded dividend factors were independently reviewed.</td>
<td>No exception noted. No exception noted. No exception noted.</td>
</tr>
<tr>
<td>6. Investment confirmations (contract notes) are sent to investors for subscription and redemption transactions to help confirm accuracy of the transactions.</td>
<td>For a selection of investment and redemption transactions, inspected confirmation statements and system logs to determine confirmations were sent to investors.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>7. A Transfer Agency analyst inputs requests for trade corrections on the Share Registration System. A second analyst reviews the trade correction, including gain/loss impact, for accuracy.</td>
<td>In the United States and the United Kingdom, for a selection of trade corrections, inspected the Share Registration System or trade correction checklist to determine the correction was secondarily reviewed. In other locations, observed the input of a trade correction to determine that the Share Registration System required the trade correction to be approved by a second individual.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>8. In the United States and United Kingdom, a late trade report is generated and reviewed. Trades on the report are researched and action is taken as necessary to help ensure that trades received after the daily cutoffs are processed on the appropriate business day. In other locations, the system alerts the user if they are initiating a late trade.</td>
<td>In the United States and the United Kingdom, for a selection of dates inspected the electronic sign-off in the Transfer Agency Workflow System or notations on the late trade report to determine the late trade report was reviewed. In other locations, observed that the systematic controls alert a user when they are initiating a late trade.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
TRANSFER AGENCY (continued)

Control Objective 37: Controls provide reasonable assurance that shareholder subscriptions, redemptions, and payments are received from authorized sources and accurately entered into the Share Registration System (continued).

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<tbody>
<tr>
<td>9 Automated controls within the Share Registration System calculate the jurisdictional tax withholding amount and deduct it from payments where required. The withholding amount is then moved to a separate account for the relevant taxing body.</td>
<td>Inspected the Share Registration System to determine that it automatically calculates the jurisdictional tax withholding amount and inspected the applicable general ledger account to determine that the withholding amount was moved to a separate account.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

PRIVATE EQUITY FUND ADMINISTRATION

Control Objective 38: Controls provide reasonable assurance that investor registration details are accurately recorded onto the Private Equity System.

<table>
<thead>
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<tbody>
<tr>
<td>1 Upon receipt of subscription documentation, PEFA reviews the documentation to ensure the investor data is complete. PEFA inputs the investor data (such as investor name, investment amount, investor contacts, and investor bank details) onto the Private Equity System. The input is subject to secondary review for completeness and accuracy.</td>
<td>For a selection of new investors, inspected the subscription documentation and the approval logs from the Private Equity System to determine that the relevant standing data was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
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</table>

Control Objective 39: Controls provide reasonable assurance that fund expenses are authorized and recorded accurately.

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<tr>
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<tbody>
<tr>
<td>1 PEFA receives expense instructions that have been approved by the investment advisor/client or other duly authorized party and inputs the instruction onto the Private Equity System. These instructions are validated in accordance with the client-authorized signatory list, and the input onto the Private Equity System is subject to secondary review for accuracy.</td>
<td>For a selection of fund expenses, inspected the instruction or checklist for evidence the instruction was reviewed to determine it was from an authorized party. Inspected the input onto the Private Equity System to determine it was secondarily reviewed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
PRIVATE EQUITY FUND ADMINISTRATION (continued)

Control Objective 39: Controls provide reasonable assurance that fund expenses are authorized and recorded accurately (continued).

<table>
<thead>
<tr>
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<th>Testing Performed by KPMG LLP</th>
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<tbody>
<tr>
<td>2 PEFA enters expense payments onto the Cash Movement System, and the input is subject to secondary review(s) in accordance with the internal-authorized signatory list prior to release.</td>
<td>Observed the input of a fund expense payment transaction to determine that the Cash Movement System required the transaction to be approved by a second individual. Additionally, observed the approval of a transaction in the Cash Movement System to determine that the system prevented a user from approving a fund expense payment for which the user did not have adequate internal authority to approve.</td>
<td>No exception noted. No exception noted.</td>
</tr>
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</table>

Control Objective 40: Controls provide reasonable assurance that private equity fund investments are made in accordance with investment advisor/client instructions.

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<tbody>
<tr>
<td>1 PEFA reviews fund investment and divestment recommendations or requests from the investment advisor/client for indication they were approved by the general partner (manager) or other duly authorized party. Checklists (manual or systematic audit trails) are used for each transaction to help ensure that each stage of the process is completed and transaction is input onto the Private Equity System. These controls are subject to a secondary review (via manual or systematic audit trails) for accuracy.</td>
<td>For a selection of fund investments and divestments, inspected checklists or audit trail for evidence that the instruction was reviewed to determine if it was approved by the directors of the fund, the general partner, or an authorized party, and the transaction was subject to a secondary review.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

Control Objective 41: Controls provide reasonable assurance that portfolio values are received from the investment advisor/client, broker, custodian, or underlying fund and completely and accurately entered onto the Private Equity System.

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<thead>
<tr>
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<tbody>
<tr>
<td>1 Periodically, PEFA receives valuations from the investment advisor/client, custodian, broker, or underlying fund manager for investments held by the fund, which are entered onto the Private Equity System and subject to secondary review for accuracy.</td>
<td>Observed the input of a fund valuation to determine that the Private Equity System required the valuation to be approved by a second individual or reviewed that a manual secondary review was performed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 41: Controls provide reasonable assurance that portfolio values are received from the investment advisor/client, broker, custodian, or underlying fund and completely and accurately entered onto the Private Equity System (continued).

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>2 On a quarterly basis, PEFA reconciles the investments held by the fund with the investment advisor/client, broker, custodian, or underlying fund manager. These reconciliations are subject to secondary review and unreconciled items are investigated and resolved.</td>
<td>For a selection of funds, inspected the investment reconciliation to determine it was completed, subject to secondary review, and unreconciled items were investigated and resolved.</td>
<td>For 6 of 30 quarterly investment reconciliations inspected, the reconciliation was reviewed and approved by the same individual. The exception was noted in the Guernsey location. Management response: While all business process activities related to the reconciliation were performed completely and accurately, management recognizes the importance of properly documenting oversight activities. Management has revisited and completed the control for the period in accordance with the standard with no issues identified. Additional training and monitoring of this control have been implemented by an independent control team.</td>
</tr>
</tbody>
</table>

Control Objective 42: Controls provide reasonable assurance that cash entries are accurately recorded onto the Private Equity System.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1 PEFA reconciles bank statements to the cash balances recorded onto the Private Equity System on a monthly basis. These reconciliations are subject to secondary review and unreconciled items are investigated and resolved.</td>
<td>For a selection of funds, inspected the monthly cash reconciliation to determine it was prepared by an analyst and secondary reviewed by senior analyst, and unreconciled items were investigated and resolved.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
PRIVATE EQUITY FUND ADMINISTRATION (continued)

Control Objective 43: Controls provide reasonable assurance that investor calls and distributions are received from authorized sources and accurately entered onto the Private Equity System.

<table>
<thead>
<tr>
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<th>Testing Performed by KPMG LLP</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1  PEFA reviews investor call and distribution recommendations or requests from the investment advisor/client for indication they were approved by the directors of the fund or general partner (manager) or other duly authorized party. Checklists are used for each transaction to help ensure that each stage of the process is completed and the transaction is input accurately onto the Private Equity System. These controls are subject to secondary review for accuracy.</td>
<td>For a selection of investor calls and distributions, inspected the checklist for evidence the instruction was reviewed to determine it was from an authorized party or general partner. Inspected the Private Equity System and checklist to determine the transaction was subject to a secondary review.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

INVESTMENT OPERATIONS OUTSOURCING

Control Objective 44: Controls provide reasonable assurance that new Investment Operations Outsourcing accounts are set up accurately.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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</thead>
<tbody>
<tr>
<td>1  The client completes the new account form, which is utilized by IOO to populate the new account mailform or checklist for setup of the account on various internal systems. The new account mailform or checklist is secondarily reviewed for accuracy and completeness. The document is then sent to internal partners to complete the various system setups that are required.</td>
<td>For a selection of new accounts, inspected the new account mailform or checklist to determine that it was secondarily reviewed and accurately set up.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 45: Controls provide reasonable assurance that cash and securities stock transactions are authorized and completely and accurately recorded.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>1</strong> Trades executed by the client's front office system are communicated electronically to the Outsourcing System. The trades are matched against a broker confirmation electronically or manually, posted to the Investment Book of Record System (Full Outsourcing client only), and communicated electronically to the custodian or prime broker. Differences between the front office and Outsourcing System are researched, resolved, and communicated to the client.</td>
<td>For a selection of trades, inspected the Investment Book of Record System and broker confirmation to determine the trade information agreed, the trade was recorded in the Outsourcing System (Full Outsourcing clients only) and communicated to the custodian or prime broker. For a selection of clients and dates, inspected the reconciliation between the front office and Investment Book of Record System to determine it was performed and differences were researched and resolved. Inspected e-mail communications and notifications to clients as well as reclassification transactions when applicable to determine differences were communicated to the client.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> IOO receives instructions from the client instructing IOO to direct the custodian or prime broker to process a money movement out for such things as fees, transaction costs, etc. IOO reviews the client instruction for indication the instruction is from a client-authorized party and processes the request on the Investment Book of Record System.</td>
<td>For a selection of money movement transactions, inspected the instruction for the FTP file process from uploading to the portal to the transmission to the agreed IP address as well as e-mail communications notifying the transition and pop up notifications supporting the instruction was reviewed to determine it was from an authorized party.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>3</strong> As agreed upon with the client, IOO generates reconciliation reports identifying cash and stock transaction discrepancies between the Investment Book of Record System and the custodian, prime broker, or fund administrator. The discrepancies are identified and sourced to the relevant department for research and resolution, and are included on a discrepancy report, which includes aging.</td>
<td>For a selection of dates and clients, inspected SharePoint documentation posted as well as e-mail communications to determine that discrepancy reports were prepared and sourced to the relevant department. For a selection of cash and stock discrepancies, inspected system transactions and reclassifications to determine that the discrepancies were researched, and resolved by the relevant department.</td>
<td>No exception noted. No exception noted.</td>
</tr>
</tbody>
</table>
INVESTMENT OPERATIONS OUTSOURCING (continued)

Control Objective 45: Controls provide reasonable assurance that cash and stock transactions are authorized and completely and accurately recorded (continued).

<table>
<thead>
<tr>
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<tr>
<td>4 As agreed upon with the client, IOO performs market value reconciliations between the Investment Book of Record System and the custodian, prime broker, or fund administrator book of record. An explanation for the discrepancy is documented when variances exceed predetermined thresholds.</td>
<td>For a selection of accounts, inspected market value reconciliations to determine they were prepared by the Account Analyst, explanations for variances above predetermined thresholds were documented by IOO, and distributed to the client.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

See additional controls under Trade Communication and Settlement – Derivatives, control objective 6.
See additional controls under Corporate Actions, control objective 20.
See additional controls under Income Collections, control objective 21.

Control Objective 46: Controls provide reasonable assurance that client reporting and fee invoicing are accurate within specified tolerances.

<table>
<thead>
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<tbody>
<tr>
<td>1 As agreed upon with the client, IOO reviews client reporting for accuracy and reasonableness and prepares reporting packs with backup documentation. Identified exceptions are routed to the originating area for research and resolution.</td>
<td>For a selection of clients, inspected reports, reporting packs and backup documentation to determine that they were reviewed and identified exceptions were researched and resolved.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 As agreed upon with the client, IOO prepares fee invoices for the clients of the client. The fee invoices are independently reviewed by IOO to help ensure accuracy.</td>
<td>For a selection of fee invoices, inspected fee invoices to determine the invoice was independently reviewed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
**TECHNOLOGY**

**Control Objective 1:** Controls provide reasonable assurance that application development, infrastructure (e.g., operating system, network device, and job schedule) installation, as well as application and infrastructure changes and maintenance are authorized, tested, properly implemented, and documented.

<table>
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</table>
| 1 Comprehensive requirements in the Software Development Life Cycle (SDLC) provide consistency in the development of new application systems and significant modifications to existing applications, and include the following key control activities performed in accordance with the relevant project methodology:  
  - A project scope is documented and approved.  
  - Business requirements are documented and approved.  
  - The technical design is documented and approved.  
  - System testing is documented and approved.  
  - User acceptance testing is documented and approved.  
  - Projects requiring data migration or conversion have appropriate checks in place to ensure data retains its integrity as migration to the new information system occurs.  
  - A production migration plan is documented and approved. | Inspected a selection of completed new application systems and significant modifications to existing applications to determine compliance with each of the specified SDLC key process controls (as prescribed in the relevant project methodology), including the following:  
  - A project scope is documented and approved.  
  - Business requirements are documented and approved.  
  - The technical design is documented and approved.  
  - System testing is documented and approved.  
  - User acceptance testing is documented and approved.  
  - Testing procedures are executed to validate the integrity of migrated or converted data where necessary based on project scope.  
  - A production migration plan is documented and approved. | No exception noted. |
| 2 A comprehensive production change management process includes control requirements that provide consistency in the modification of existing application systems, operating system platforms, network devices and settings, and production job schedules, and include the following key control activities:  
  - Change requests must be documented, including for a summary of the change, the implementation and verification plans, and a backout plan.  
  - Change requests are risk assessed and approved by authorized approvers based on their risk level. | Inspected a selection of planned changes to significant application systems, operating system platforms, network devices and settings, and production job schedules to determine compliance with each of the specified key process controls, including the following:  
  - Change requests must be documented, including a summary of the change, the implementation and verification plans, and a backout plan.  
  - Change requests are risk assessed and approved by authorized approvers based on their risk level. | No exception noted. |
TECHNOLOGY (continued)

Control Objective 1: Controls provide reasonable assurance that application development, infrastructure (e.g., operating system, network device, and job schedule) installation, as well as application and infrastructure changes and maintenance are authorized, tested, properly implemented, and documented (continued).

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| 3 A comprehensive production change management process includes emergency program change control requirements that provide consistency in the modification of existing application systems, operating system platforms, network devices and settings, and production job schedules, and include the following documentation and key processes:  
  • Documented description of the emergency.  
  • Documented description of the modification to production.  
  • Changes are performed by an authorized individual.  
  • Approval by authorized approvers is required within seven calendar days of the change. An escalation process is invoked when approvals have not been completed on time. | Inspected a selection of emergency changes to significant application systems, operating system platforms, network devices and settings, and production job schedules to determine compliance with each of the specified key process controls, including the following:  
  • Documented description of the emergency.  
  • Documented description of the modification to production.  
  • Changes are performed by an authorized individual.  
  • Approval by authorized approvers is required within seven calendar days of the change; where approval is not obtained on time, verified the change was appropriately escalated and subsequently approved. | No exception noted. |

Also, see control 2.6 for testing of sensitive developer access to production applications.

Control Objective 2: Controls provide reasonable assurance that logical access to application data files and programs is limited to properly authorized and appropriate individuals.

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<tbody>
<tr>
<td>1 Requests for new access or changes to existing access must be approved by an authorized individual, other than the access recipient, prior to processing.</td>
<td>For a selection of new access and access change requests, inspected requests to determine that they were approved by an authorized individual prior to processing and provisioned accurately based on requests.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Transfer employee information is provided by Human Resources to Global Access Control to facilitate removal of sensitive access rights.</td>
<td>For a selection of transferred employees, inspected the transfer request and access privileges to determine that sensitive access was removed.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 Network access is automatically suspended upon systematic notification of termination from Human Resources and subsequently removed.</td>
<td>For a selection of terminated employees, inspected system activity logs to verify that network access was disabled upon notification of termination from Human Resources; and that the account was subsequently deleted.</td>
<td>No exception noted.</td>
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</table>
**TECHNOLOGY (continued)**

Control Objective 2: Controls provide reasonable assurance that logical access to application data files and programs is limited to properly authorized and appropriate individuals (continued).

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<tr>
<td>4 Northern Trust computer platforms supporting critical business functions authenticate users' identities. Authentication controls adhere to the requirements defined in Northern Trust's IT risk policy and standards. In the event that particular operating systems or applications cannot conform to Northern Trust password standards due to system limitations, management undergoes formal risk assessment as part of the Technology Risk Management deviation process.</td>
<td>Inspected the password management software to determine that settings were in compliance with Northern Trust standards. For all operating system platforms, inspected password settings to determine that they were in compliance with Northern Trust standards, or that a deviation was approved in accordance with Technology Risk Management deviation process. For a selection of applications not managed by the password management software or the operating system platform, inspected password settings to determine that they were in compliance with Northern Trust standards, or that a deviation was approved in accordance with the Technology Risk Management deviation process.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
| 5 Update access to production platforms, including software libraries and files, parameter tables, and sensitive system commands, is restricted to authorized individuals.                  | For a selection of servers from each significant operating system platform, inspected user access lists to determine, through Human Resources reporting structure and resource owners, the appropriateness of access to the following items:  
  - System utilities  
  - Operating system privileges and functions  
  - Other sensitive system settings | No exception noted.  |
Control Objective 2: Controls provide reasonable assurance that logical access to application data files and programs is limited to properly authorized and appropriate individuals (continued).

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<tbody>
<tr>
<td>6 Update access to production applications, including object code and load software libraries, production data files, and data transmission files, is restricted to authorized individuals. For applications that are part of the Separation of Duties Program (SDP), changes made by application developers are captured in production activity logs and reviewed by an independent team.</td>
<td>For a selection of production applications, inspected access lists for the appropriateness of direct logical access rights to critical application files. For a selection of production applications that are part of SDP, performed the following: • Inspected access lists from the Electronic Password Vault (EPV) tool and associated resource owner approvals to determine the appropriateness of logical access rights to the production IDs used to implement changes into production. • Inspected samples of SDP compliance reports to determine that change logs were correlated to Production ID checkout logs and matched against change request tickets.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>7 Reports identifying sensitive access violations or failed attempts at access to sensitive accounts are produced and periodically reviewed.</td>
<td>Inspected a selection of privileged access activities on the Unix platform to determine that these activities were appropriately reviewed and acknowledged. Inspected a selection of attempted access violation reports for other significant operating systems to determine that such reports were reviewed by appropriate personnel and follow-up actions were taken as necessary.</td>
<td>No exception noted. No exception noted.</td>
</tr>
<tr>
<td>8 Northern Trust requires all managers to perform an annual review of their direct reports' access. If not completed within 60 days of the due date, the user's access (other than basic access such as email, etc.) is suspended until the review is completed by the manager.</td>
<td>For a selection of managers, inquired and observed managers performing reviews to gain an understanding of how the review is performed. For a selection of managers, inspected annual access reviews to determine that reviews were performed. For reviews that were not completed within 60 days of the due date, reviewed system logs to determine if access was suspended appropriately. For a selection of partners, inspected IDM to determine that partners' access rights are commensurate with their job responsibilities.</td>
<td>No exception noted. No exception noted. No exception noted.</td>
</tr>
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</table>
TECHNOLOGY (continued)

Control Objective 3: Controls provide reasonable assurance that the Northern Trust computer network, including remote access, is adequately secured and monitored to allow permitted traffic, and protect against inappropriate intrusions.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
<th>Testing Performed by KPMG LLP</th>
<th>Results of Tests Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Client-sensitive application data transmitted over the public Internet is encrypted.</td>
<td>For a selection of critical applications that transmit client-sensitive data over the public Internet, inspected server configuration settings to determine that encryption processes, were utilized.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>2 Network traffic is restricted, authorized, and controlled through firewalls and segregated network zones.</td>
<td>Inspected Northern Trust network topology to determine Internet traffic is segmented from the internal network using firewall devices. Inspected a selection of periodic reviews of firewall rules, to determine that reviews were performed by management in accordance with documented procedures. Inspected a selection of periodic reviews of update access to firewall configurations, to determine that reviews were performed appropriately by management. For a selection of firewall devices, inspected configurations to determine that firewall software versions were supported.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>3 An intrusion detection process has been implemented to monitor corporate network traffic and identify critical events. Log files are secured from unauthorized access and forward to the corporate logging solution for correlation and analysis by the security operations center. Critical events identified from this activity are logged, and appropriate follow-up action is taken.</td>
<td>Inspected Northern Trust network diagrams and lists of logged devices from the corporate logging solution to validate that the corporate network is being monitored. Inspected a selection of device logs to determine that activity was logged and that log files are protected from unauthorized access. Inspected system reports to determine that device logs are forwarded to the corporate logging solution. Inspected a selection of critical security events to determine that appropriate follow-up action was taken.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td>4 Periodic vulnerability assessments are performed of externally facing devices and findings are prioritized for remediation. Resulting issues are addressed.</td>
<td>Inspected a selection of vulnerability assessments to determine that results were communicated to senior Technology management and that issues were addressed.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 3: Controls provide reasonable assurance that the Northern Trust computer network, including remote access, is adequately secured and monitored to allow permitted traffic, and protect against inappropriate intrusions (continued).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>5</strong> Operating systems are kept up-to-date with supported versions, and operating system software patches are risk assessed and applied based on the assessed risk profile. In the event that particular operating systems cannot be maintained at a current vendor-supported version due to application or other limitations, management undergoes formal risk assessment as part of the Technology Risk Management deviation process.</td>
<td>For each significant operating system platform, performed the following:  - Inspected a selection of servers to determine that each operating system version was current or that a deviation was approved in accordance with the Technology Risk Management deviation process. Inspected a selection of servers to determine that the operating system patches were risk assessed and applied according to the assessed risk profile.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>6</strong> Remote data access is controlled by security software and virtual private network devices that authenticates the user based on predefined criteria and limits access to only authorized resources.</td>
<td>Inspected security settings and user access lists for a selection of virtual private network devices to determine that users were authenticated based on predefined criteria and access was restricted to authorized resources.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>

Control Objective 4: Controls provide reasonable assurance that physical access to data center equipment is limited to properly authorized individuals.

<table>
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</thead>
<tbody>
<tr>
<td><strong>1</strong> Data centers are secured through the use of encoded ID cards, biometric scanners, or lock and key.</td>
<td>For each data center, observed that physical access controls (e.g., encoded ID cards, biometric scanners, or locks) were in place to secure access.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> New data center access privilege requests are reviewed and approved by an authorized individual prior to access being granted. Data center access privileges are reviewed by management at least semiannually.</td>
<td>For each data center, inspected a selection of data center access requests to determine whether the request was properly authorized prior to access being granted. For each data center, inspected a selection of periodic reviews of access privileges, to determine that reviews were performed by management.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
Control Objective 5: Controls provide reasonable assurance that computer processing is authorized, scheduled, and performed in accordance with prescribed procedures and deviations are identified and resolved, and that external data transmissions are complete and authorized.

<table>
<thead>
<tr>
<th>Controls Specified by Northern Trust</th>
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</thead>
<tbody>
<tr>
<td>1 Monitoring and alerting are in place for errors encountered during batch job processing. Issues are tracked for timely resolution. Monitoring and alerting are in place for errors encountered during external data transmission processing. Issues are tracked for timely resolution.</td>
</tr>
<tr>
<td>2 Access to modify the production job schedule is restricted to authorized individuals.</td>
</tr>
<tr>
<td>3 Changes to the production job schedule follow the change management process, which requires a documented request and authorization.</td>
</tr>
<tr>
<td>4 As part of a comprehensive production change management process, emergency changes to the production job schedule require a documented request and authorization by the appropriate level of management within seven calendar days of the change. An escalation process is invoked when approvals have not been completed on time.</td>
</tr>
<tr>
<td>5 Systematic controls exist to ensure that external data transmissions received and sent by Northern Trust are authorized and complete based on predefined criteria.</td>
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<tr>
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<tbody>
<tr>
<td>For a selection of production job processing events, inspected job abends to determine that appropriate action was taken, as defined by relevant procedures, and that required supporting documentation accompanied the successful completion of these activities. For a selection of data transmission processing events, inspected job abends to determine that appropriate action was taken, as defined by relevant procedures, and that required supporting documentation accompanied the successful completion of these activities.</td>
</tr>
<tr>
<td>Inspected the production job scheduling system to determine that logical access to modify the schedule was restricted to authorized individuals.</td>
</tr>
<tr>
<td>Inspected a selection of planned changes to production job schedules to determine compliance with the production change management process, including authorization.</td>
</tr>
<tr>
<td>Inspected a selection of emergency changes to production job schedules to determine compliance with the production change management process, including authorization.</td>
</tr>
<tr>
<td>Inspected a selection of external data transmissions setup protocols within the transmissions database to determine that transmissions were authorized and were systematically validated for completeness.</td>
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</table>

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<tr>
<th>Results of Tests Performed</th>
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<tbody>
<tr>
<td>No exception noted.</td>
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<td>No exception noted.</td>
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<td>No exception noted.</td>
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</table>
TECHNOLOGY (continued)

Control Objective 6: Controls provide reasonable assurance that data is routinely backed up and is available for restoration in the event of processing errors.

<table>
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<th>Testing Performed by KPMG LLP</th>
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<tbody>
<tr>
<td><strong>1</strong> Procedures for performing backups are in place. Backups are electronically vaulted to an automated tape library at an alternate site and retained for a period of time, and are periodically tested.</td>
<td>For a selection of servers on each significant operating system platform, inspected system configuration settings to determine that an established backup process was in place, which includes the transfer of complete backup of files to an alternate site for a defined retention period. For a selection of data restoration requests, determined that the integrity of backups was tested through successful restoration.</td>
<td>No exception noted.</td>
</tr>
<tr>
<td><strong>2</strong> Access to modify backups of production data is restricted to authorized individuals.</td>
<td>Inspected a selection of production data backups to determine that logical access to modify the backup data was restricted to authorized individuals.</td>
<td>No exception noted.</td>
</tr>
</tbody>
</table>
V. ADDITIONAL INFORMATION PROVIDED BY NORTHERN TRUST CORPORATION
BUSINESS CONTINUITY AND DISASTER RECOVERY PLANNING PHILOSOPHY
For purposes of this document, business continuity (BC) is defined as the capability that allows a business to continue production processing without material disruption to clients or client information during a business interruption. Disaster recovery (DR) refers to those technology-related processes that facilitate recovery of the production computing environment in the event of a disaster. Typically, this involves transferring production to back up or alternate computing devices and sites, where they can fully assume the day-to-day critical processing needs.

BUSINESS CONTINUITY PLANNING RESPONSIBILITIES AND ORGANIZATION STRUCTURE
Northern Trust’s dedicated Global Business Continuity and Recovery Services (GBCRS) group maintains Northern Trust’s BC and DR standards, provides overall BC and DR strategic and tactical direction, and is responsible for corporate plan activation in conjunction with the Incident Command System teams. The group maintains staff in all global regions.

Governance Structure
Northern Trust’s BC/DR governance structure extends from the corporation’s Board of Directors to business unit management:

- Business Risk Committee (BRC) – A committee of the board of directors, whose members include the chairman of the corporation and at least three independent directors, one of whom chairs the committee. All committee members have an understanding of risk management principles, and at least one member has experience in identifying, assessing, and managing risk exposure of large, complex financial firms. The BRC annually reviews the corporate business continuity plan, testing results, significant events/outages, and opportunities for improvement.

- Operational Risk Committee – The committee oversees and provides executive insight and guidance to operational risk management, including BC and DR activities. The committee is chaired by the Chief Operational Risk Officer. Membership includes business unit chief risk officers Director of GBCRS and members of the corporation’s management group.

Daily Operations
On a daily basis, Northern Trust teams manage business continuity planning and testing in every region with the support of the GBCRS group.
- Business Unit teams – Leaders from each of Northern Trust’s business units who possess a business continuity or disaster recovery designation direct division plan development, and identify resource requirements for each major line of business and critical business function. During a business interruption, these teams are responsible for communications and coordination of activities within their area with the Incident Response Team representatives who are participants of Northern’s Incident Command System.
- Divisional teams – Designated staff within each business unit serves to develop and maintain recovery plans for critical functions performed within their respective groups. The plans include personnel call trees, facilities information, critical records, equipment information, and step-by-step procedures to be activated in the event of a disaster.

Incident Command and Control
Northern Trust has adopted and adapted the Incident Command System to manage disaster response. The Incident Command System was originally developed in the 1980s by a consortium of U.S. community and federal government agencies to address the need for an effective, adaptable, simple, and flexible incident management system. Widely used by government and private organizations globally, Northern Trust began using the Incident Command System structure in December 2004 to better organize and manage emergency response across its many regions, locations, and business unit organizations. Northern Trust’s Incident Command System is designed with an organizational structure that assigns command, operations, planning and intelligence, and logistics, finance, and administration sections to manage emergency situations. Primary and secondary Corporate Emergency Operations Centers (EOC) are maintained to serve as the central command and communication point for major incidents. The Corporate EOC is staffed at time of disaster by members of the Corporate Incident Response team (CIRT). Northern Trust exercises the Incident Command System each year.

In addition to the CIRT, other significant operation centers also follow the Incident Command System model and have Local Incident Response Teams (LIRT) that meet in designated or temporary Local EOCs. In the event of an incident, the Local Incident Commander activates the corresponding LIRT. The CIRT is prepared to activate and staff the Corporate EOC as necessary to assist with a local event until it is under control.
CORPORATE POLICY AND STANDARDS
The GBCRS group has created a Corporate Business Continuity Management Policy document and implemented multiple standards, which establish corporate-level requirements. The Policy is a key governance document of Northern Trust’s BC Program. Roles and responsibilities for BC and DR programs are included in the Policy and standards. At the highest level, the Policy defines requirements for how Northern Trust will conduct Business Continuity as defined by management and approved by the Board. The standards include topics such as the following:

Business Continuity:
- Business Continuity Plans
- Business Continuity Testing

Disaster Recovery:
- Application and Platform Disaster Recovery Plans
- Disaster Recovery Testing

ENTERPRISE-WIDE BC AND DR PLANNING, TESTING, REVIEWS, AND MISSION-CRITICAL BUSINESS PROCESSING

BC/DR Planning Templates
Northern Trust BC and DR plans and standards are not built from a single template or a single strategy. As Northern Trust is a financial company head quartered in the United States, and has a U.S. banking presence, Northern Trust falls under the regulatory scope of the Federal Financial Institutions Examination Council (FFIEC). The FFIEC is a formal interagency body empowered to prescribe uniform principles, standards, and report forms for the federal examination of financial institutions by the Board of Governors of the Federal Reserve System (FRB), the Federal Deposit Insurance Corporation (FDIC), the National Credit Union Administration (NCUA), and the Office of the Comptroller of the Currency (OCC), and to make recommendations to promote uniformity in the supervision of financial institutions. Most U.S. regulators use the FFIEC IT Examination Booklets as the basis for their IT regulatory examinations. One of those FFIEC Booklets covers Business Continuity Planning. Northern Trust has used this as a basis for its BCP development.

Northern Trust is a worldwide corporation, and we have drawn from and incorporated both the best business continuity planning requirements and the unique needs of regulatory entities in all of the countries we serve.

Plan Development
BC and DR Plans are required for all business units pursuant to corporate standards. Plan requirements are clearly delineated within Corporate BC and DR standards. At a minimum, plans are reviewed and updated on an annual basis, as corporate policy and standards require.

Business unit management and technology support management are the owners, final reviewers, and approvers of BC and DR plans maintained by their groups. These managers are responsible for making sure that BC and DR plans meet the needs of the clients and the Corporation and that the plans are robust enough in nature to help assure recovery in the event of their use to as full an extent possible.

Northern Trust has developed repository databases for BC and DR plans and test results. These repositories facilitate the storage, backup, and management (tracking and reporting) process. The repositories also facilitate workflow processes for reviewing and approving BC and DR documents.

Plan Testing
Corporate-level standards have been written, approved, published, and disseminated to Northern Trust staff that delineates requirements for testing business unit plans, computer application plans, and computer hardware platform and infrastructure plans. It is the intention of these standards that critical business functions and components of the business plans are tested, and those tests are documented on an ongoing basis, which occurs at least annually. This requirement provides assurances that the necessary functions can be maintained or resumed in the event of a disaster, thereby continuing services to our clients. Testing is an iterative process and is a continual learning and improvement opportunity. The scope of testing can be modified where necessary to address areas of importance.

To assist with plan testing, GBCRS facilitates testing throughout the year. For BC Plan testing, facilitated Simulation exercises are provided and conducted during the year. A Simulation exercise is an opportunity for management and staff to practice plan execution using a predefined realistic scenario and is played out through a focused, managed discussion of the BCP in order to validate the plan as complete, comprehensive, and reliable. For DR Plan testing, GBCRS works with management in the Technology Department to designate weekends throughout the year to be dedicated to testing failovers to the disaster recovery equipment. In addition to the tests facilitated by GBCRS, BC and DR plans can also be tested at the discretion of management using a variety of techniques, one of which would be using the plan to respond to a live event or outage.
Overall plan test results are required by standard to be:
 Documented in a standard manner that includes a section for noting any action items discovered during the test that require follow-up
 Stored in the Business Continuity and Disaster Recovery documentation repositories
 Reviewed by business unit management or technology support management to approve the results of the business continuity and disaster recovery tests, and verify that plans are updated (if necessary) and items requiring follow-up actions are addressed.

Plan and Test Review
Business unit activities that are critical business functions and support production processes are required to have detailed plans to address loss of critical business functions. Regular improvements are expected and achieved by continual testing and revision of plans. Plans and test results are subject to review by Northern Trust’s Audit Services department and banking regulators.

Status Reporting
GBCRS routinely monitors and measures Business Continuity risk with the reports below. These reports are distributed to senior management with oversight responsibility for BC and DR, the BC Advisory Committee, Risk Committees, and BC and DR Coordinator distribution lists. The Operational Risk Committee also receives the reports monthly as part of their packet of materials.

- BC Plan Approval - Lists the total number of BC plans by region and business unit and the number of plans that are due for updating, past due, unapproved, or missing for a particular department or division.
- BC Plan Testing - Lists the number of BC plans tested by region and business unit and the percentage of testing completed.
- Resiliency seats - Number of resiliency center seats tested.
- DR Plan Approval - Lists the total number of DR plans by region and the number of plans that are due for updating, past due, or missing.
- DR Plan Testing - Lists the total number of DR plans by region and type (platform or application), the number of DR plans to be tested, and the percentage of testing completed.

Escalation Reporting
Escalation reporting occurs in the event that action is not taken to minimize risk as a result of late or missing documentation. Escalation reports are distributed to Senior Risk Officers for each line of business. A copy of the escalation reporting is also sent to the applicable business unit BC Coordinator, Global Business Continuity and Recovery Services (GBCRS), the manager of the Director of GBCRS, and, to the extent the plan approvals and testing remain past due more than 90 days, the Operational Risk Committee is informed.

- List of BC and DR plans with approvals past due
- List of BC and DR plans with testing past due
- List of untested resiliency seats

Plan Approvals
In order for escalation to the next level of management to occur, BC and DR plans must have been past due in the previous quarter.

Plan Testing
Within the first two weeks of each calendar year, a list of department/divisions that did not submit a test report for approved BC plans, and DR plans that were not tested and approved, will be shared with the applicable BC Advisory Committee representative and Management Group member and will be included on the Test Exception Report provided to the Business Risk Committee. Commentary will specify that the plans for the given department/division are not in compliance with Corporate BC and DR Testing Standards and need to complete a test immediately.

ALTERNATE WORK LOCATIONS AND STRATEGIES
BCPs for critical business functions are required to identify an alternate location for core staff to resume normal business operations. Depending on the office size and business function performed, alternate work locations could include one or more of the following:

- Proprietary Resiliency Centers
- Contracted Recovery Space
- Another Northern Trust Office Location
- Provisions to Work From Home

Additionally, BCPs for critical business functions may indicate Transfer of Work (ToW) to other locations during an event. To the extent that ToW is so indicated, both the sending and receiving locations must agree to the scope and terms of the strategy, which will be memorialized in a response plan. Where ToW is indicated for critical business functions, it will be tested annually pursuant to corporate standards.

Northern Trust has several proprietary business resiliency centers that provide alternate work space for critical staff to quickly resume business processing after an emergency event. These resiliency centers are located some distance from the primary business location they serve, in order to insulate them from being affected by the same emergency event, but still in an area to allow staff to relocate in a reasonable time frame to resume business processing. Northern Trust currently has proprietary business resiliency centers outside of: Chicago, Illinois in the United States; Dublin in Ireland; London in the United Kingdom; Guernsey
in the Channel Islands; and Bangalore in India. Remaining Northern Trust offices use an alternate work space location that is either contracted or provided by another Northern Trust location.

Northern Trust partners are eligible to participate in Northern Trust's Business Resiliency work from home (BR-wfh) program. The BR-wfh program provides a global sustainable work from home capability to enable previously identified staff to continue business processes from their home during a business interruption.

Use of these Proprietary and Work From Home alternate locations are actively exercised throughout the year by staff relocating to work from the location during the working week. Other alternate locations are tested on a schedule determined by business unit management, as required by corporate standards. Additionally, Transfer of Work (TOW) is tested as required by the corporate standards.

THIRD-PARTY PROCESSING CONTROLS
Business units occasionally determine that a service is best performed by an outside third party. As a result, a Third-Party Outsourcing Committee has been established that conducts technical due diligence reviews of prospective and contracted technology outsourcing vendors. See additional information under “Technology and Vendor Outsourcing” in Section III.

SITE HAZARD ANALYSIS
A site hazard analysis is a process used to identify potential vulnerabilities that a facility might face as well as to determine the level of protection already in place to mitigate known risk(s). Hazards reviewed include man-made (e.g., fire and terrorism), natural (e.g., hurricanes and tornados), and technology (e.g., power failures and service provider failures). Each hazard is assessed to determine the likelihood of the hazard and the impact to the location. Site hazard analyses are completed for significant data processing installations and operation centers by GBCRS. Any significant issues identified are presented to the Operational Riskor the local Risk Committee.

CORPORATE DATA CENTERS
Northern Trust has implemented a resilient design for our Corporate Data Centers such that both facilities represent mirror images of one another, acting in a peer capacity that serves to back each other up. Equipment housed in these facilities is discussed further in Section III, under the “Technology.” The computing architecture includes a blend of mainframe and distributed processing platforms, which are resident in two distinctly separate geographic locations for purposes of BC/DR and have been strategically placed such that it is highly unlikely a significant common threat exists to both.

Various techniques, which are noted below, are in place to provide for no or minimal loss of data and to maximize our recovery capabilities to meet client business needs:

- Asynchronously mirrored production data
- Operating/subsystem inherent and application specific abilities such as dump and restore, snap shots, etc.
- High-speed storage area network farms
- Automated tape libraries/silos
- High-availability standby processors
- Duplicate hardware
- Redundant/resilient managed point-to-point fiber optic network with completely diverse routes

In the event of a disaster at one of our Corporate Data Centers, the other data center is equipped to recover critical processing within 12 hours or less. Individual applications, whether disrupted by an entire data center outage or other incident, may be recovered in 5 hours or less.

In addition to peer data centers that provide for a complete technology backup for local and regional recovery, these facilities also provide Business Resiliency with additional workstation coverage for critical business function, cannot fail operational functions.

NORTHERN TRUST REGIONAL PROCESSING FACILITIES
Northern Trust has nearly 100 offices worldwide. These offices connect to Northern Trust's Corporate Data Centers for most of their systems' needs, as well as transaction and recordkeeping functions, which are supported by the Operations Center that is part of the corporate headquarters campus. However, Northern Trust has other Regional Data and Operations Centers. These Regional Data Centers, which house technology and business systems that are unique to our worldwide offices, are located in London, Toronto, and Singapore. Significant Regional Operations Centers are located in London, Dublin, Limerick, Guernsey, Luxembourg, and Bangalore. The staff at these locations is covered by and is familiar with the corporate standards on BC and DR. The GBCRS group works with the staff and management of these regional offices to help ensure their disaster preparedness, reviewing plans and tests, consulting on needs unique to these centers, and assisting in other areas as well.

Regional offices have detailed BC and DR plans in place, which they test at least once per year. DR tests are conducted regularly to verify that this regional technology can be recovered quickly, can connect completely to other Northern Trust Corporate Data Centers, and that production processing can resume supporting our customers worldwide. Northern Trust's Regional Data Centers follow corporate standards and “industry best practices” with regard to physical and logical security, protection of data,
protection of their infrastructure and facility, etc. These Regional Processing Facilities are reviewed by Northern Trust’s Audit Services department as well as by any financial industry governing body or national government agency that is appropriate for their location. In addition, since the Corporation is headquartered in the United States, the U.S. Federal Reserve Bank and the Illinois Department of Financial and Professional Regulation also have the authority to review our Regional Processing Facilities.