



System and Organization Controls 1 (SOC 1) Report

*Independent Service Auditor's Report on IBG LLC's Description of
Its Brokerage Operations System and the Suitability of the Design
and Operating Effectiveness of its Controls*

For the Period January 1, 2021 to December 31, 2021



CliftonLarsonAllen LLP
West Hartford, Connecticut



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Table of Contents

Section I: Independent Service Auditor's Report	3
Section II: IBG LLC's Management Assertion.....	8
Section III: Description of IBG LLC's Brokerage Operations System	11
Scope and Purpose of the Report	12
Overview of the Services Provided and Operations	12
Description of the Brokerage Operations System.....	13
Relevant Aspects of the Overall Control Environment.....	24
Description of General Computer Controls.....	29
Complementary Subservice Organization Controls	32
Complementary User Entity Controls	33
Section IV: Description of IBG LLC's Control Objectives and Related Controls, Independent Service Auditor's Tests of Controls, and Results of Tests	34
Purpose and Objectives of the Report	35
Tests of Operating Effectiveness	35
Procedures for Assessing Completeness and Accuracy of Information Provided by the Entity (IPE) ..	36
Control Objective A – Account Administration	37
Control Objective B – Trading Product Setup and Modification	38
Control Objective C – Trading	38
Control Objective D - Clearing.	39
Control Objective E - Settlement.....	40
Control Objective F – Stock Record Reconciliation and Control.....	41
Control Objective G – Corporate Actions - Dividends.....	43
Control Objective H – Customer Margin.....	45
Control Objective I – Net Capital.....	46
Control Objective J – Funds Processing (Checks and Wires).	47
Control Objective K - Pricing.	50
Control Objective L – Account Transfers.....	51
Control Objective M – Customer Reporting.....	52
Control Objective N – Network Operations.....	54
Control Objective O – Information Security	55
Control Objective P – Change Management.....	58

Section I

Independent Service Auditor's Report



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Independent Service Auditor's Report

To the Management of
IBG LLC

Scope

We have examined IBG LLC's ("IBG," or the "Service Organization") description of its brokerage operations system entitled "Description of IBG LLC's Brokerage Operations System" for processing brokerage services transactions throughout the period January 1, 2021 to December 31, 2021 (description) and the suitability of the design and operating effectiveness of controls included in the description to achieve the related control objectives stated in the description, based on the criteria identified in "Assertion of IBG LLC Management" (assertion). The controls and control objectives included in the description are those that management of IBG believes are likely to be relevant to user entities' internal control over financial reporting, and the description does not include those aspects of the brokerage operations system that are not likely relevant to user entities' internal control over financial reporting.

IBG has engaged various entities (subservice organizations) to perform the following services, as detailed below:

- Equinix, Inc., for providing colocation data center services.
- Iron Mountain, Inc., for backup tape storage services.

The description includes only the control objectives and related controls of IBG and excludes the control objectives and related controls of the subservice organizations. The description also indicates that certain control objectives specified by IBG can be achieved only if complementary subservice organization controls assumed in the design of IBG's controls are suitably designed and operating effectively, along with the related controls at IBG. 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 IBG's controls are suitably designed and operating effectively, along with related controls at the service organization. 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, IBG 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. IBG is responsible for preparing the description and 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 Auditors' 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 performed in accordance with attestation standards established by the American Institute of Certified Public Accountants and International Standard on Assurance Engagements (ISAE) 3402, *Assurance Reports on Controls at a Service Organization*, issued by the International Auditing and Assurance Standards Board. Those standards require that we plan and perform our 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 January 1, 2021 to December 31, 2021. 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 referenced above.
- 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 therein, 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 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 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, 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 IBG's assertion:

- a. The description fairly presents the brokerage operations system that was designed and implemented throughout the period January 1, 2021 to December 31, 2021.
- 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 from January 1, 2021 to December 31, 2021 and the subservice organizations and user entities applied the complementary controls assumed in the design of IBG's controls throughout the period January 1, 2021 to December 31, 2021.
- c. The controls operated effectively to provide reasonable assurance that the control objectives stated in the description were achieved throughout the period January 1, 2021 to December 31, 2021, if complementary subservice organizations and user entity controls assumed in the design of IBG's controls operated effectively throughout the period January 1, 2021 to December 31, 2021.

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 IBG, user entities of IBG's brokerage operations system during some or all of the period January 1, 2021 to December 31, 2021, 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.

CliftonLarsonAllen LLPA handwritten signature in black ink that reads "CliftonLarsonAllen LLP". The signature is written in a cursive, flowing style.

**West Hartford, Connecticut
January 31, 2022**

Section II

Assertion of IBG LLC Management



Assertion of IBG LLC Management

We have prepared the description of IBG LLC's ("the Company," "IBG," or "we") brokerage operations system entitled, "Description of IBG LLC's Brokerage Operations System" for processing brokerage services transactions throughout the period January 1, 2021 to December 31, 2021 (description) for user entities of the system during some or all of the period January 1, 2021 to December 31, 2021, 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.

IBG has engaged various entities (subservice organizations) to perform the following services, as detailed below:

- Equinix, Inc., for providing colocation data center services.
- Iron Mountain, Inc., for backup tape storage services.

The description includes only the control objectives and related controls of IBG 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. 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 IBG's controls are suitably designed and operating effectively, along with related controls at the service organization. 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 brokerage operations system made available to user entities of the system during some or all of the period January 1, 2021 to December 31, 2021 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 the service organization's system during the period covered by the description.
 - iii. does not omit or distort information relevant to the service organization'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 user auditors, and may not, therefore, include every aspect of the brokerage operations 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 January 1, 2021 to December 31, 2021 to achieve those control objectives if subservice organizations and user entities applied the complementary controls assumed in the design of IBG's controls throughout the period January 1, 2021 to December 31, 2021. 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 the service organization.
 - 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.
 - iii. the controls were consistently applied as designed, including whether manual controls were applied by individuals who have the appropriate competence and authority.

The Management of IBG LLC

January 31, 2022

Section III

Description of IBG LLC's Brokerage Operations System

Scope and Purpose of the Report

This report describes the control structure of IBG LLC (IBG) as it relates to its Brokerage Operations System throughout the period of January 1, 2021 to December 31, 2021. This report is intended solely for the information and use of IBG, user entities of IBG's Brokerage Operations System and the independent auditors of such users.

IBG uses various subservice organizations to perform the following services:

- Equinix, Inc. (Equinix) to provide colocation data center services.
- Iron Mountain, Inc., for backup tape storage services.

The above-named subservice provider's controls are not included in the scope of this report.

The scope of this report is limited to IBG's services regarding the Brokerage Operations System. User organizations and their independent auditors are responsible for determining whether the services provided to them by IBG are in the scope of this report.

Overview of Services Provided and Operations

Company Overview

IBG LLC ("IBG" or the "Company") is an automated global electronic broker and market maker which includes IBG LLC custody and service accounts for hedge and mutual funds, registered investment advisors, proprietary trading groups, introducing brokers and individual investors. IBG LLC specializes in routing orders while striving to achieve best executions and processing trades in securities, futures, foreign exchange instruments, bonds and mutual funds on more than 120 electronic exchanges and market centers around the world.

For the purpose of the report, IBG refers to the following entities: Interactive Brokers LLC, IBKR Financial Services AG, Interactive Brokers Hong Kong Limited, Interactive Brokers Canada, Interactive Brokers (U.K.) Limited, Interactive Brokers Central Europe ZRT, Interactive Brokers Corp., Interactive Brokers (India) Private Limited, Interactive Brokers Securities Japan Inc., Interactive Brokers Australia Pty Limited, Interactive Brokers Luxembourg SARL, Interactive Brokers Singapore Pte. Ltd. and Interactive Brokers Ireland Limited

Overview of Services

IBG LLC's primary business segment is electronic brokerage.

Electronic Brokerage Operations

As a direct market access broker, IBG serves the customers of both traditional brokers and prime brokers. IBG LLC provides customers with an advanced order management, trade execution and portfolio management platform at a very low cost. Customers can simultaneously access many financial markets worldwide and trade across multiple asset classes (stocks, options, futures, foreign exchange ("forex"), bonds and mutual funds) denominated in multiple currencies, on one screen, from a single account based in any major currency. Large financial advisor and broker-dealer customers may "white brand" the trading interface (i.e., make the trading interface

available to their customers without referencing IBG's name), or can select from among modular functionalities, such as order routing, trade reporting or clearing on specific products or exchanges where they may not have up-to-date technology, to offer their customers a comprehensive, global range of services and products.

IBG LLC performs the following services for its customers:

- Trade Clearing and Settlement
- Reconciliation and Control (custody and safekeeping of securities)
- Pricing and Valuation of Customer Positions
- Corporate Actions – Dividends and Reorganization Processing and Reconciliation
- Wire Transfer, Check Processing and ACH
- Customer Reporting

Customers initiate transactions electronically through a variety of processes. Transactions are processed directly into a specific order entry system either electronically through direct customer input, or to a much lesser extent by fully registered branch office personnel if necessary.

Security transactions referenced above are processed directly into IBG's trade processing, clearing and settlement systems. IBG LLC's Corporate Actions department process dividends and reorganizations (i.e., tender offers, stock splits).

IBG LLC's Clearing and Control department also confirms that positions with custodians and internal ledgers are reconciled. Customer reporting, including electronic confirmation and statement reporting services, are also provided. Securities pricing is facilitated by the Technical Clearing Operations Group which confirms pricing data obtained from independent pricing vendors which is updated across IBG's internal firm and external customer reporting systems.

Description of the Brokerage Operations System

The following section describes the systems, included in the IBWeb application, utilized by the Company to support its business. IBG receives customer order requests from various sources and applications, trade confirmation information from various clearing corporations and depositories, and reference information relating to corporate announcements and pricing from external vendors. There are numerous systems involved in the processing of brokerage related transactions.

Significant computerized systems, included in the IBWeb application, supporting IBG's daily activities include:

System Name	Description
Credit Manager	Automatically confirms that customers have sufficient credit for transactions before orders are executed.
Trade Store	Utilized by Operations personnel as a repository of all trades.
Price Store	Utilized by Technical Clearing Operations personnel to store prices for securities.

System Name	Description
ClearWeb	Utilized by Clearing Operations personnel as a repository of reports.
Real Time Trade Match (RTTM)	Utilized by Clearing Operations personnel to match all trades. All matched trades are transferred to IBG's books and records.
Centralized Position Reconciliation (CPR)	Utilized by Clearing Operations personnel to reconcile positions between IBG's books and records versus depository locations.
Dividend Reconciliation System	Utilized by Corporate Actions personnel to inquire, update, and review the status of dividends.
Corporate Actions System	Utilized by Corporate Actions personnel to maintain reorganization information.
Liquidation Monitor	Monitors that each customer account is properly funded and liquidates positions to maintain margin requirements.
Cashiering System	Utilized by Cashiering Personnel to enter and disburse checks, wires and ACH transactions.
CAST	Utilized by Customer Service and Compliance personnel as a repository for customer account information including customer agreements.
SWIFT	Utilized by Treasury personnel to process wire instructions and track payments.
IB Release	Program change management system used by the Information Technology group to track and approve program changes.
IB Inventory Management System	Utilized by Clearing Operations personnel to track and report on Broker to Broker trading activity.
IB Reference Database	Trading products are set up in IB Reference Database

System Name	Description
CardServ	Utilized for the processing of Debit Card transactions
Retail Equity Clearing	Calculates customer interest margin and commission rates based on underlying market interest rates and agreed upon commission rates respectively.
Client Trading Platforms (TWS/WebTrader/Mobile/Client Portal)	Trading platform utilized by the user entities.

Infrastructure

Strong authentication and access controls are implemented to restrict administrative access to the IBWeb application. Employees access the IBWeb application through their desktop on company supplied computers either through the local area network or by VPN using 2-factor authentication if accessing remotely. IBG follows a formal process to grant or revoke employee access to IBG systems and the IBWeb application.

User access is restricted through the use of unique user IDs and strong passwords. Periodic reviews of access lists are implemented to help ensure access is appropriate and authorized. Access to production machines and network devices is managed via an access group management system and membership in these groups must be formally approved prior to the granting of access. IBG has processes in place to identify and remediate vulnerabilities. Both internal and external reviews are performed on a routine basis. Action plans to address identified findings are compiled and remediated by members of the IT group.

The hosting of IBG's database servers is outsourced to a third-party data center colocation provider, Equinix, Inc. The associated controls over physical and environmental protection of the servers are now overseen by Equinix. Change management policies are in place and procedures for tracking, testing, approving, and validating changes are formally documented. IBG requires all changes to be reviewed and approved by a separate technical resource, other than the developer, to evaluate the quality and accuracy of changes. All changes are also tested prior to their migration to the production environment.

Account Administration

Upon opening a new account, customers must sign an agreement to maintain an internet connection in order to correspond with IBG. New customers complete a customer application and will provide or upload themselves required information into the CAST System, which include personal information, financial qualifications (income, liquid assets, net worth), product knowledge, and trading objectives. CAST is used to track the application process and retain the required documentation. Verification of the provided information will be completed by the system. The application is then reviewed and approved by the firm within two days prior to the account opening to ensure that information verification protocols and other required tasks were completed.

Modifications to existing accounts, including changes mailing address, phone number, email address, taxID, and bank information must be changed manually by customers when they log into their account. An automated email will be sent to customers participating in the 2-factor authentication Secure Login System, notifying the customer that the change(s) have been processed and notifying them to contact the Company if they cannot confirm that the change was made on their end. If the customer does not participate in the Company's 2-factor authentication Secure Login System, IBG sends an email asking

the customer to review and confirm the changes they made. The customer must then confirm the changes by logging into the website and indicating their approval. Account changes are made within two business days upon submission and approval from the customer.

Trading Product Setup and Modification

Trading products are automatically set up in IB Reference Database. On a daily basis, files are automatically uploaded to the IB Reference Database system using feeds from various external sources including data providers and exchanges. The uploaded files include both new and updated trading product information.

For products that have only one source, rules have been created within IB Reference Database to help ensure the integrity of the data. In addition, when there are multiple sources for a trading product, the system automatically performs a comparison between the information in the various feeds. Data feed breaks and differences between feed sources are automatically compiled in daily exception reports. The breaks and differences identified within the exception reports are further reviewed by the assigned Operator. If deemed necessary, corrective action is taken and the changes are manually re-validated within the IB Reference Database system.

Trading

Once a customer's account has been set-up during the Account Administration process, the customer is granted access to IB's electronic trading system to input and execute trades. Customers have direct access to the electronic trading platforms to submit trading requests and are responsible for ensuring that inputted trades are accurate and complete. Trades requested by customers through the electronic trading platforms are fed and recorded real time to IB's books and records. The following security measures have been put into place by IB to ensure that only authorized customers can submit requests for trades:

- Users must have a unique username and password, with passwords being:
 - 8 characters in length.
 - Must contain a mixture of upper and lowercase letters and numbers.
- Multi-factor authentication using a SecureID token.

IBG recommends that customers use a Secure Login Device as an additional layer of security besides the traditional login ID and password. If a customer chooses not to participate in the Secure Login System, they are required to sign a Notice and Acknowledgement agreement confirming their understanding and agreement with restrictions on their account.

Clearing

The primary responsibility of the Clearing Operations department is to research and monitor the resolution of trade breaks and to confirm accurate recording of trades in a timely manner. Clearing personnel utilize the Real Time Trade Match (RTTM) system to monitor the comparison of IBG's transactions to the exchanges and clearinghouses.

Reconciliation of House and Street Information

On a daily basis, an automated comparison of trades recorded in IBG's clearing systems is performed with those reported by the clearinghouses. Cleared trades are matched in real time, with exceptions appearing on the Real Time Trade Match (RTTM) queue.

Throughout the trading day, trades that are un-matched appear on the RTTM queue and are reviewed by Clearing Operations Department personnel, who analyze the cause for each break and attempt to resolve them. In the event a break is not resolved intra-day, Clearing personnel include a comment stating the reason for the break. Once all breaks are addressed, the Clearing personnel approves the day's activity and a static RTTM report is created each night detailing all breaks that were not resolved during the day. The Clearing Operations Department operator's designated Supervisor will then review and approve the reports to verify that all outstanding breaks detail a comment stating the reason for the break.

On a monthly basis, the RTTM reports are reviewed and a summary page is signed off by the VP of Clearing Operations to ensure that any unresolved breaks were researched, remediated, and that all required approvals for the month were documented and retained.

Settlement

The Clearing Operations department is responsible for the settlement of all securities. The settlement process is mainly automated and Clearing personnel are responsible for researching and monitoring breaks. In addition, Clearing personnel also monitor that daily settlement activity is recorded accurately, completely, and processed in a timely manner.

Settlement Monitoring/ Resolution of Fails Post Settlement Date Reconciliation

On settlement date, securities either not received (fail to receive (FTR)) or delivered (fail to deliver (FTD)) are tracked to resolution in the IBWeb stock record. On settlement date +1, Clearing Operations Department personnel perform a comparison between clearinghouses and IBWeb for anticipated securities and cash to be received. Breaks are identified, documented, and researched within Settlement Difference Reports and monitored to completion by Clearing Operations Department personnel. On a daily basis, the Settlement Difference Reports are signed off by the Clearing Operations Department personnel's designated Supervisor to verify that all breaks were identified, documented, and further researched.

On a monthly basis, the reconciliation of control accounts, for which the Settlement Difference Reports are inclusive, are created and reviewed by the VP of Clearing Operations to ensure that all outstanding breaks have been resolved if able to be and that any remaining breaks have a valid explanation documented.

On a daily basis, Clearing Operations Department personnel track broker-to-broker fails to resolution using the Broker to Broker Fails Report from the Inventory Management System. Aged broker-to-broker fails are reviewed and confirmed on a quarterly basis by a group independent of the Clearing department with the counterparty and tracked to resolution.

Management Review of Aged Items

Management is responsible for the review of aged settlement breaks on the Settlement Difference reports. On a monthly basis, reconciliations of controls accounts (which the Settlement Difference reports are inclusive) are created and reviewed by the VP of Clearing Operations who follows-up where necessary.

Stock Record Reconciliation and Control

The Clearing Operations Group is responsible for the resolution of breaks between custodian records and IBG's stock record, as well as the aging of open position differences. While the vast majority of securities are in book entry, a vault is maintained by the Credit department for the few physical securities.

Stock Record Reconciliation

IBG utilizes various depositories to maintain securities held by both IBG and its customers. On a daily basis, Clearing Operations personnel reconcile positions between the depositories and the Company's books and records. The positions are automatically calculated and reported within Position Difference Reports that are cumulative with breaks remaining on the report until resolution. The Position Difference Reports are reviewed daily by a designated Supervisor to ensure that all breaks were identified and that a corresponding explanation for the break was documented.

Aged Items and Management Reporting

On a monthly basis, Position Difference Reports are reviewed and electronically signed off by the VP of Clearing Operations within the Centralized Position Reconciliation system to ensure that any outstanding aged breaks were researched and remediated and that all required approvals for the month were documented and retained.

Vault of Physical Securities

Any securities that are removed or entered into the vault are logged and signed in or out by a Clearing employee.

The vault of physical securities is maintained by the Credit Department. The Clearing Operations Department tracks the positions in the vault via the "Vault Balance Report." On a quarterly basis, someone independent of the Clearing Operations Department verifies that the Vault Balance Report reconciles to the certificates maintained in the vault. Discrepancies are documented, researched, and resolved.

Corporate Actions

Dividends

One of the primary functions of the Corporate Actions department is the event capture, payment processing, and verification of dividends utilizing the open payable/receivable dividend payment reconciliation.

On a daily basis, dividend announcement information is uploaded using an automated feed from external vendors. The Company calculates the expected dividend to be paid based on the announcement details that are received. The Dividend Reconciliation System compares the internally calculated dividend payments with the payments received in the Company's accounts at the depository. Differences are researched and resolved in a timely manner by Corporate Actions Department personnel.

On dividend payment date, Corporate Actions Department personnel collect and reconcile funds received from custodians/agents to confirm that funds due to the Company are received. On a monthly basis, reports of unresolved breaks for payment reconciliations are generated by the Dividend System and sent to Corporate Actions management for further review to ensure that breaks are further investigated.

Reorganizations

The primary functions of the Corporate Actions Group's Reorganization department include event capture, customer elections, instructions processing, payment processing, post-payment reconciliation, and management reporting.

Event Capture

Mandatory and Voluntary reorganization announcements are received on a daily basis via feeds from vendors. The feeds are stored in a secured FTP site and then transferred into the clearing system through the automated job scheduler. If the feed into the clearing system does not run to completion, the error will be noted on the failed job schedule (see Information Systems Operations for job scheduling processes and controls).

Mandatory Event Processing

Corporate Actions personnel compare details for mandatory reorganization announcements received from the vendor with other sources (e.g., depositories, other vendors, company's website, and prospectus). Once reorganization event details have been confirmed and approved, the events are processed in the Corporate Action System on the same day.

Customer Elections for Voluntary Announcements

Voluntary announcements are received on a daily basis via feeds from vendors. Corporate Action personnel review the announcement information within the Corporate Action system. Once the terms of the voluntary event are confirmed and approved by management, customers who hold a position in the effected security receive a message via Account Management. Customers can choose to participate through the Account Management. The requests to participate are sent directly to the Corporate Actions system for processing where Corporate Actions personnel receive the customer instructions. Corporate Actions personnel runs a step in the Corporate Actions system that compares the client submitted positions to the customer's holdings on expiration day.

The system will then adjust the quantity, in cases where the quantity originally submitted exceeded what the client held on expiration date. The Corporate Actions managers review the instructions and coordinate with the depository for completion. The Corporate Actions system tracks customers who elect to participate in voluntary elections. On the effective date, Corporate Actions personnel monitor the Corporate Action system for accurate and timely updates to customer accounts. Any differences are researched and resolved.

Position Verification and Payment Processing

Internal calculations are performed to determine the cash or security proceeds expected to be collected from custodians/agents at the time of payment. On payment date, various depositories provide the firm with the new positions and/or cash. In the event that there is a difference between the internal and external records, the differences will be either identified on the daily Position Difference report, which is reviewed by the Clearing department, or Financial Controls reconciliation between the cash obtained by Accounting and Corporate Actions' records. Discrepancies are investigated and resolved.

Management Reporting

On a monthly basis, Corporate Actions management reviews and signs off on the Corporate Actions Reports detailing balances of operating ledgers including unallocated Corporate Actions. Differences from the Open Payable/Receivable files are resolved accurately, completely and timely with the use of detailed files received from the clearinghouses.

Customer Margin

The Global Risk Management group is responsible for monitoring both margin customer accounts to comply with applicable regulatory and house requirements. IBG does not issue margin calls, rather customer accounts are monitored in real time and, if the customer accounts fall below regulatory margin requirements, IBG's systems will automatically liquidate positions necessary to bring the account back in compliance. This policy is incorporated into the customer margin agreement that is signed by the customer when the margin account is established. The liquidated positions will be reflected in the customer's statement on the following day. Initial margin requirements are calculated at the time an order is entered. The Credit Manager System continuously calculates maintenance margin requirements on a real-time basis. Prior to the close of the exchanges' regular trading hours, the Credit Manager System computes the overnight margin requirements (at the applicable initial margin rate) for each securities position pursuant to Regulation T (Reg T) or Portfolio Margin requirements.

On a daily basis, Risk personnel monitor the "Summary of Liquidation Disabled Accounts" report showing customer accounts in which the automatic liquidation function has been disabled. While uncommon, the automatic liquidation function can be disabled if necessary to prevent an erroneous liquidation. The inaccurate pricing of a security when a corporate action is being processed is an example of when the disabling of the automatic liquidation function is necessary. Management monitors the report and helps ensure that an explanation is provided for the liquidation disable status. Management also reviews the liquidation disabled accounts to determine whether there are circumstances or events that would require them to reconsider the liquidation disable status (account exclusion).

Net Capital

IBG is required to calculate and monitor regulatory capital for its broker dealers. For Canada, the CanHair Margin system is used to identify haircuts and deductions to be used in the calculation of regulatory net capital for Interactive Brokers Canada. On a daily basis, the CanHair application is run to generate the "Detail" file listing the underlying securities for the calculation.

On a monthly basis, for IBC, the Regulatory Reporting Department performs a reconciliation between the daily net capital estimate for the last business day of the month and the Investment Industry Regulatory Organization of Canada (IIROC) Report for the Canadian regulators IIROC MFR report. The reconciliation is further reviewed to ensure its accuracy and completeness and that any variances on the monthly reconciliation are researched and resolved.

On a monthly basis, personnel from the Regulatory Reporting Group create the Investment Industry Regulatory Organization of Canada (IIROC) Report for the Canadian regulators. The compiled IIROC Report is reviewed to ensure that the numbers reported match to the final month end balance sheet and that variances are researched and resolved.

Funds Processing (Checks and Wires)

Cashiering department personnel facilitate customer-initiated deposits and disbursements to and from customer accounts via checks and wires. On a daily basis, the Cashiering department reviews customer deposits and withdrawals in the IBWeb Cashiering System which are reconciled to bank transmission reports. Cashiering personnel review any exceptions with incoming and outgoing wire transfers for customer accounts.

Check and Wire Deposit Processing

Customers enter deposit notifications for deposits to be processed. IBG systems match incoming deposits (checks and wires) with deposit notifications entered by customers. If they match, the deposit is credited to the customer's account. If they don't match, the deposit goes into the Unknown queue for review by Cashiering personnel.

Checks received in the mail are scanned using the ACHeck21. Check file is automatically loaded into the IBWeb Cashiering System where check images are stored. The transactions will automatically move to the unapproved entries queue for authorization/approval by IBWeb Cashiering System approver. The evidence of approval is retained in the IBWeb Cashiering System. If insufficient identifiers are found on the check, the Cashiering group researches the account number prior to processing the deposit.

For personal checks, the Cashiering system links the bank account to the customer's account after the first approval. Any subsequent deposits from that checking account will be automatically approved. Cashiering personnel reconcile check totals in each batch from the Cashier Report to information which was sent to the bank locations electronically. Customer wires are sent systematically to the bank and the bank notifies IBG of receipt the next day.

Check and Wire Deposit Research

Cashiering personnel are responsible for researching and resolving unknown check and wire deposits utilizing the Cashiering Suspense Report from IBWeb's Unknown queue on a daily basis. Once the accounts are determined, information is added into the IBWeb System and journal entries are automatically created to post deposits to the correct account.

Matching of entries is done either automatically through preset criteria or manually by Cashiering personnel. Certain items, such as wire deposit returns and bounced checks, are required to be matched manually by Cashiering personnel. Unidentified wires are returned to the originating bank. Unidentified checks are returned to the maker.

Check and Wire Deposit Management Review

The "Suspense Items over Two Weeks Old" report detailing aged items (checks and wires) is available online for personnel each day and printed and provided to management on a weekly basis. The "Evidence of Supervisory Review by Senior Management" report is used to evidence the review of the suspense items which is signed off on by the Treasurer.

Disbursements

Disbursement requests are entered by customers directly online through Account Management. On a daily basis, IBG systems confirm the availability of funds and only send funds to the name and address on file for checks and approved banking instructions for wires.

Cashiering manually-entered check disbursements are signed off by the approved banking signors for checks (two signors are required for check withdrawals). The evidence of two signors' review and the supporting documentation is kept in the daily cashiering package. Checks are processed within seven business days, once required documentation is completed.

Customer wire withdrawals manually entered by Cashiering are subject to dual approval by the appropriate signatories within the swift application on the day they are entered. If the disbursed funds are being sent to an outside party/different bank information/different address than what is on file, additional approval is needed. For disbursements and receipts, cashiering reviews the "cashiering reconciliation report" on a daily basis. This report displays unmatched entries between the IBWeb cashiering system and bank which includes debit card transactions. Cashiering and accounting review the differences and resolve any unreconciled items.

Wire Disbursement Processing

Wire transmissions are systematically checked by the Credit Manager System which ensures sufficient funds are available for withdrawal. IBG systems only send funds to the approved banking instructions on file. Once requests have passed risk edit checks within the IBWeb System, the distributions are systematically transmitted to the bank via a SWIFT message.

Check Disbursement Processing

Cashiering is responsible for processing both electronic and manual check disbursement requests. Similar to wire disbursements, electronic check disbursement requests are automatically generated once the IBWeb system once the request passes the credit checks.

Manual Check & Wire Disbursement Process

For manual check requests, Cashiering personnel confirm that checks have been authorized by the appropriate level of senior management and confirm the signatures of the approvers. Two signers are required for check withdrawals. The request is then forwarded to the Accounts Payable department where the check is created. In coordination with Citibank, IBG uses "Positive Pay" requiring all check details to be uploaded and matched before any funds can be drawn against checks. Blank check stock is stored in a locked filing cabinet in the Accounts Payable department. The evidence of Treasury's review and the supporting documentation is kept in the daily cashiering package.

Customer wire withdrawals manually entered by Cashiering are subject to dual approval by the appropriate signatories within the Swift application. If the disbursed funds are being sent to an outside party/different bank information/different address than what is on file, additional approval is needed.

IBG offers customers a debit card program. Transaction requests are sent to IBG's systems by an external vendor to the CardServ system. Debit Card transactions are processed through the Cashiering system. The Cashiering system sends the request to the Credit Manager to perform a credit check and provide authorization or rejection. The decision is sent back to the external vendors through CardServ. Following the processing of the transaction, Cashiering receives the settled charge from CardServ. On a daily basis, the Cashiering system then reconciles the settled charges within the Cashiering system verses the transactions identified at the bank. Cashiering reviews the "Cashiering Reconciliation Report" which displays unmatched entries between IBWeb Cashiering System and the Bank which includes debit card transactions. Cashiering and Accounting review the differences and resolve any unreconciled items.

Pricing

The securities pricing function is facilitated by the Technical Clearing Operations Group. The primary responsibility of the group is to confirm that pricing data received from pricing vendors is recorded accurately across IBG's systems. "PriceStore" is the primary system used for maintaining prices by IBG. PriceStore interfaces with the Clearing databases and receives daily feeds directly from numerous vendors including Telekurs and Bloomberg.

Daily File Checks

Various automated system checks are applied to incoming pricing files to confirm their timeliness and completeness. Technical Clearing Operations personnel monitor pricing files received from authorized vendors at pre-set schedules daily assisted by the Clearing Scheduler which monitors production runs throughout the day. Various automated system checks are applied to incoming pricing files to confirm their completeness.

The Clearing Scheduler tracks the pricing files received by external vendors. If a file fail occurs, the scheduler indicates the failed step name which is then reviewed by Technical Clearing Operations personnel who follow-up with the appropriate vendor. Job fails are also escalated to the business users, if necessary.

Quality Control

On a daily basis, the IBWeb: Statement system determines the profits and losses (PnL) of all customer accounts. The system analyzes each statement for excessive PnL. For accounts that exceed the tolerance.

Clearing Operations reviews the accounts identified to determine if the PnL was caused by a pricing error and will take corrective action. The review of the COB PnL Summary is performed prior to the day's customer statements being generated.

Technical Clearing Operations personnel review the online Missing Closing Price Report and send the details of the report to the pricing vendors in order to obtain missing prices. If a price cannot be obtained from the vendors utilized by IBG, Pricing personnel obtain missing prices from outside vendors. The Missing Closing Price Report also maintains a status for each unpriced security.

Account Transfers

Customers request account transfers (i.e., Account Transfer Online Notification (ATON) and Automated Customer Account Transfer (ACAT)) using the IBG Account Management system.

Account Transfers are processed by the Clearing System with indicative information automatically matched with the counterparty. Securities included in the incoming account transfers are ran through the Credit Manager system to see if the securities are recognized by the Company's systems and to determine the level of margin allowable for each. If the securities are not recognized, the account transfer would be rejected. Outbound account transfers are also analyzed through The Credit Manager to see if the transfer results in a negative equity balance. If the transfer would result in a negative equity balance, the account transfer will be rejected. If a failure in the asset transfer occurs, the failure will appear as part of the Broker to Broker fails report. (See section E-Settlement for controls related to the Broker to Broker fails).

Free of Payment

On an as needed basis, customers enter Free of Payment (FOP) transfer requests through their account on IBG's website. Each FOP transfer request is automatically processed upon passing credit and validation checks. FOP transfer requests that do not pass validation are suspended and reprocessed within seven business days once updates are made.

Customer Reporting

The customer reporting function is performed by the Customer Reporting Group. The group is primarily responsible for the overall quality and accuracy of the information contained in the statements and confirmations posted to customer accounts. Electronic statements are automatically created on a daily basis for customers to view online. Batch scheduled jobs are run on a daily basis to generate and update the customer reporting statements. Batched scheduled job fails are monitored, researched and resolved. Statements accurately reflect all trade activity that occurred in the account. On a monthly basis, customers are also notified by e-mail that their monthly statement is ready to be viewed regardless of account activity.

Customer interest margin is automatically calculated within the IBWeb Retail Equity Clearing system, on a daily basis, using current underlying market interest rates pulled in automatically within the system. Interest is automatically reflected in the corresponding customer reporting statement on the following day. For commission amounts, amounts are automatically calculated within the IBWeb Retail Equity Clearing system for each transaction using predefined commission rates agreed upon between IBG and the customer. Commission amounts are automatically reflected in the customer's statement on the following day. The ability to input new or edit current commissions rates housed within the IBWeb Retail Equity Clearing system is limited to designated personnel. When a new commission rate or a change to an existing commission rate is entered into the system, it is subjected to secondary review for accurate input.

Relevant Aspects of the Overall Control Environment

IBG LLC's internal control structure aligns with and encompasses components as defined in the "Internal Control – Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). COSO's five components of internal control include Control Environment, Risk Assessment, Information and Communication, Control Activities, and Monitoring, each of which is described below.

Control Environment

IBG LLC's internal control environment reflects the overall attitude, awareness, and actions of management, the board of directors, and others concerning controls and the emphasis given to controls as expressed by IBG LLC's policies, procedures, methods, and organizational structure.

IBG LLC's control environment reflects the views and beliefs of management regarding the importance of internal controls. This is evidenced by the day-to-day practices, behaviors, and operating style of management, and the emphasis given to internal controls in IBG LLC's policies, procedures, organizational structure, and operating practices. The following is a description of the key elements of IBG LLC's control environment.

Risk Governance, Audit Coverage, and Management Oversight

The control environment and Company culture are influenced significantly by the Board of Directors. The board of directors is appointed to act on behalf of IBG's shareholders which consist of a majority of independent members. The roles and responsibilities of the board of directors are segregated from the roles and responsibilities of management in accordance with IBG's bylaws and corporate governance guidelines. The bylaws and corporate governance guidelines also dictate the professional background and skillsets required for members to sit on IBG's board. Management and the board of directors establish measurable goals and performance evaluation criteria, including incentives and other rewards appropriate for responsibilities at all levels at IBG, while considering the achievement of both short-term and long-term objectives. Established short-term and long-term goals and performance criteria for IBG senior management are reviewed and approved annually by the Compensation Committee.

IBG's board of directors meet at least on a quarterly basis. The agenda normally consists of reviewing and discussing any significant deficiencies identified with the performance of internal control and other incidences. Action plans, if any, are discussed and finalized as needed at these meetings.

IBG has put together a security steering committee that provides additional support and oversight to complement the board of directors with respect to roles and responsibilities relevant to security, availability, processing integrity, and confidentiality. IBG's security steering committee will meet on a periodic basis to discuss strategy, current operations, risk considerations and other factors critical to the business.

The Audit Committee has a formal written charter. The charter includes a provision for the Committee to perform an annual self-evaluation that includes reviewing the Audit Committee Charter and addresses all items required by applicable securities regulations and the Sarbanes Oxley Act. Additionally, the Audit Committee approves and validates the Internal Audit plan and receives periodic progress updates throughout the year.

A compensation committee has also been formed by IBG. The Compensation Committee's associated charter requires the committee to create, amend, and approve IBG's compensation and benefit programs to ensure the attraction, retention and appropriate reward to IBG's employees, to motivate their performance in the achievement of IBG's business objectives and to align the interest of such employees with the long-term interests of IBG's stockholders and administer and interpret such compensation and benefit programs.

IBG is subject to audits from its internal audit department who are independent from IBG's management. Periodic audits are performed by the audit department, including information security assessments, and the department will meet with the Board of Directors at least on a quarterly basis to provide relevant information resulting from assessments conducted by internal and external parties where needed. The internal audit department will also formally publish their procedures and findings in audit reports and work with management and the board of directors to remediate the issues and deficiencies identified in their audits.

Management's Philosophy and Operating Style

Management's philosophy and operating style significantly affect the way the entity is run including the types of business and legal risks it accepts. IBG LLC emphasizes the importance of ensuring that the integrity of processing is management's priority including controls to mitigate such risk. IBG LLC's management has always placed emphasis on providing the best execution, a full range of products as requested by customers as well as service to customers.

IBG LLC has an independent Compliance department that advises and monitors the supervisory process. Additionally, the department provides guidance to business units and employees so that they may act in accordance with the rules and regulations that govern the securities industry. Industry rules and regulations to which IBG is subject include those of the Securities and Exchange Commission (SEC), FINRA, Investment Industry Regulatory Organization of Canada (IIROC), other member Exchanges and regulatory organizations, and the various states and jurisdictions in which IBG conducts business.

The Board of Directors has approved policies and procedures to report improper practices and improprieties. These policies are set forth in the new-hire package provided as well as the employee policies and procedures manual. The policies include procedures for which employees are required to alert management of any improprieties to which the employee becomes aware. Depending on the nature of the improprieties, the Audit Committee and the Board of Directors or the Compliance department is notified. Thereafter the procedures are documented, investigated and resolved in a timely and thorough manner.

Organizational Structure

An entity's organizational structure provides the framework for achieving entity-wide objectives that are planned, executed, controlled, and monitored. Two critical aspects of establishing an organizational structure are defining key areas of authority and responsibility and establishing lines of reporting. Company management will evaluate its organizational structure, reporting lines, authorities, and responsibilities on an ongoing basis and will revise these when necessary to support the achievement of objectives.

IBG is comprised of separate functional groups designed to facilitate effective operational capability and to ensure appropriate segregation of duties between functions. Each area is under the direct responsibility of a senior manager and consists of the following functional groups: Clearing, Risk Management, Customer Reporting, Clearing Operations, Cashiering, Customer Service, and Treasury. Roles and responsibilities are further defined within written job descriptions and communicated during the hiring process and available upon request. Job descriptions are reviewed on an as-needed basis to enable execution of authorities and responsibilities and flow of information to manage the activities of IBG.

Assignment of Authority and Responsibility

The control environment is influenced significantly by the extent to which individuals recognize that they are held accountable. This includes the Chairman/CEO and CFO who share responsibility for all activities including the internal control system. It also covers assignment of authority and responsibility for operating activities and the establishment of reporting relationships and authorization protocols. To carry out duties, policies are regularly communicated on appropriate business practices.

Standard Operating Policies and Procedures

Employees receive regular communication about the levels of integrity, ethical behavior, and competence expected. Such communications relate to practices such as hiring, orientation, training, evaluation, counseling, promotion, compensation, and remedial actions.

IBG LLC has formal hiring practices designed to ensure that new employees are qualified for their job responsibilities. All applicants undergo an interview process that assesses their qualifications for the position's responsibilities. IBG LLC conducts pre-employment reference checks based on information provided on the application. In addition, IBG LLC conducts background investigations of past employment history, credit record, and any criminal activity.

IBG LLC has policies and procedures set forth in the following:

1. New Employee Package
2. Employees Policies and Procedures
3. HR Policies and Procedures Manual

The Compliance department annually reviews the application and effectiveness of policies and practices set forth in the Employee Policies and Procedures manual. The Board has designated the Associate General Counsel to be responsible for investigating all reports of violation of the Code of Business Conduct and Ethics Policy.

Risk Assessment and Monitoring

Operational risk is defined as the risk of loss resulting from the failure of people, internal processes, systems or from external events. The primary responsibility for managing operational risk on a day-to-day basis lies with the businesses and support groups. Management provides the framework within which these groups manage operational risk. These groups manage operational risk in a number of ways including the use of technology to automate processes, the establishment of policies and key controls, the provision and testing of business continuity plans, and the training, supervision, and development of staff.

IBG management performs a risk assessment on an annual basis. The risk assessment is based on the objectives established by management. The objectives incorporate the service commitments and system requirements of the brokerage system. The associated process includes management identifying changes to business objectives, commitments and requirements, fraud considerations, internal operations, regulatory and legal matters that threaten the achievement of their business operations, and information required and expected to support the internal control and the achievement of IBG's service commitments and system requirements. In response to the identification of such risks, management updates its policies, procedures and internal controls. As a result of this risk assessment, if management identifies the need for new controls, management will consider a mix of control activities for implementation for any unaddressed risks to their operations. As a result, management has developed a list of control activities to manage the technology infrastructure, change management and security access risks that have been identified from the risk assessments that have been completed.

Integrity and Ethical Values

An environment that demands integrity and ethical values is critical to building and maintaining an effectively controlled organization. Similarly, the effectiveness of internal controls is rooted in the integrity and ethical values of the people who create, administer, and monitor them. The Company has programs and policies designed to promote and ensure integrity and ethical values throughout the organization. These corporate policies cover areas such as standards of performance, integrity, productivity,

professionalism, ethics, values, and conduct. These policies are published, accessible to all employees, and are enforced. Periodically, management communicates the importance of these policies and ethical standards to all employees.

The Company maintains an employee policies and procedures manual which documents employment terms, benefits, limitations, funds, office administration rules, and a code of conduct. A hardcopy of the manual is given to employees when they join the Company and then, annually thereafter, via an electronic copy. All new employees are required to acknowledge that they have read the policy manual by signing and dating a form, and then returning it to HR. Annually, employees are given a document containing important recent compliance topics that need to be acknowledged. The Company has also set up an external compliance hotline (Ethics Point) to receive anonymous employee submissions of any concerns or complaints.

Commitment to Competence

Competence should reflect the knowledge and skills needed to accomplish tasks that define an individual's job. Through consideration of an entity's objectives and the strategies and plans for achievement of those objectives, management must determine how well these tasks need to be accomplished. Management needs to specify the competence levels for particular jobs and to translate those levels into requisite knowledge and skills.

IBG's management has defined and analyzed the tasks comprising particular jobs including such factors as the extent to which individuals must exercise judgment and the extent of related supervision. In addition, the knowledge and skills required to perform particular jobs have also been determined by Company management and are communicated to all employees.

Employees registered with the Financial Industry Regulatory Authority (FINRA) must attend annual in-house training and external regulatory training must be completed every 3 years. FINRA sends an email reminder to Compliance listing individuals who have not completed the training. Compliance then follows up with all noted individuals to confirm when they will be attending (and have completed) the training.

Information and Communication

IBG LLC has various methods of communication that ensure employees understand their individual roles and responsibilities regarding transaction processing and controls and that significant events are communicated in a timely manner. These methods include orientation and training programs for newly hired employees and ongoing professional, industry and executive management education for current employees, the use of e-mail messages to communicate time-sensitive announcements, and a global firm wide Intranet for the dissemination of company specific information including current events, organization structure charts, human resources information, and department specific policies and procedures. IBG LLC uses various technology platforms, infrastructure and applications based on the needs of multiple business groups and customer requirements. Various groups within IBG's information technology group are responsible for establishing and monitoring the execution of various online and batch jobs to ensure the integrity of processing of customer transactions and instructions and their posting into the relevant journal and ledgers accounts. IBG LLC has established information security policies and procedures that provide for security over information resources. These policies and

procedures can be accessed by all employees via the Intranet. Procedural documents also provide guidance for the design, development, testing, and deployment of application systems projects that ensure the consistent implementation of systems based on management's business priorities.

Description of General Computer Controls

General computer controls are used in the development and maintenance of applications and for computer processing activities, applicable to numerous applications. These controls provide the fundamental control structure that contributes to the reliability of information processing.

Network Operations

Job Scheduling

The Clearing Job Scheduler is utilized to control batch processing (e.g., job submission, job monitoring) in order to execute jobs in the right order on the right day. Job failures and breaks are monitored with the use of the real time detection within the Clearing Scheduler system and appear as open items. Failures are monitored by the Technical Clearing Operations specialists for timely review and resolution. Technical Clearing Operations specialists will address the root cause of the failure or escalate it to the appropriate programming staff for resolution. Limited personnel have access to the Clearing Job Scheduler to activate or deactivate jobs and /or make changes to job order.

Backup Operations

Differential backups occur daily and full backups occur weekly. Backups are run to completion as evidenced by an automated email sent from the system to management daily. Backup failures are further researched and resolved as they occur.

Information Security

IBG LLC has documented and communicated security policies that define the information security rules and requirements for the security environment. Furthermore, documented policies and procedures are in place to guide personnel in the entity's confidentiality commitments and the associated system requirements. The policies and procedures are communicated to internal personnel.

Network, Application, Operating System, and Database Security

IBWeb is an application suite which houses multiple applications within its system. The Authentication Management System is the centralized access administration system for IBWeb applications. New user access for applications, database accounts and UNIX (Operating System) is set up and requested by the new employee's direct manager in the Authentication Manager System. The request must be approved by the employee's Authentication Officer before the rights are finalized and active. For IBG Applications and Infrastructure (Network and OS), users authenticate via user ID's and passwords. User password parameters are configured such that they are compliant with IBG's Information Security Policy.

Users are given access to Authentication Management systems via unique user IDs. Annually, the IBWeb application user list is reviewed online in the Authentication Manager System by Authentication Officers based on their respective areas. The AMS Officers' access are reviewed by the IBG CISO as part of the annual review. When notified of a transfer of an employee who has system access, the Human Resources (HR) group begins the process of updating the employee's access. Human Resources sends out an e-mail to the system administrator for the access that needs to be removed. Once the account is disabled on the systems and access is terminated, the system administrator then adds the new user access.

When notified of terminated employees who have system access, HR disables IBWeb access directly in the Authentication Management System (AMS) and a checklist is created to track other offboarding tasks. Privileged-level access (e.g., security administrators) to applications and infrastructure components is authorized and appropriately restricted. IBG has designed application-enforced segregation of duties to define what privileges are assigned to users within IBWeb.

Network Security

Network information security logs are used to record access and attempted security breaches. Logs are reported to a centralized SysLog collections system and reviewed throughout the day as part of systems monitoring activity. In order to prevent unauthorized outside access to IBG's network, servers are accessed through firewalls. Antivirus software is configured to detect and prevent the transmission of data or files that contain certain virus signatures recognized by the antivirus software.

Network traffic is secured by Cisco and Juniper firewalls as well as network switches and routers with access control lists. Legitimate and illegitimate access to routers, switches, and network devices are recorded by the audit logs in the firewalls, switches and routers, and a copy is sent to the syslog monitoring files. These are reviewed along with the other device logs as part of the daily process.

Connections between IBG's entities and the internal network are secured from external threats through the use of dedicated communication lines, routers, and firewalls. Most of the connections to IBG have paired routers and multiple paths providing alternate routes should any network path fail. Network topology, network diagrams, and network systems specifications are maintained by IBG. Transmission outside the boundaries of the brokerage system occurs through the use of authorized software supporting advanced encryption standard. Furthermore, databases, workstations, and files containing sensitive and confidential data are encrypted at rest.

For remote access connectivity, employees use Virtual Private Network (VPN) remote access software with two factor authentication that encrypts the data transmissions. Only pre-approved active employees have access to IBG's VPN. Access to the VPN user identifications is reviewed on an annual basis by the CIO.

External network vulnerability scans are performed on a monthly basis. A remediation plan is developed, and changes are implemented to remediate all critical and high vulnerabilities at a minimum. An annual third-party penetration test is performed. Action plans to address identified findings are compiled and remediated by members of the IT group.

IBG has incident response policies and procedures in place that includes an escalation plan based on the nature and severity of the incident to senior management, the board of directors and external parties. When a potential security incident is detected, a defined incident management process is initiated by authorized personnel. Corrective actions are implemented in accordance with defined policies and procedures.

Physical and Environmental Security - Data Center

Physical and environmental data center controls are provided by Equinix.

Change Management

Formally documented change management procedures are in place to govern the modification and maintenance of production systems and address security, availability, processing integrity, and confidentiality requirements.

Applications

Proposals for system changes are reviewed and approved during weekly Steering Committee meetings. At these weekly meetings, the committee discusses potential project viability and the availability of resources in order to decide if the project warrants approval. If the project is approved, the senior programming manager develops high level specifications of the project for the programmers assigned to the enhancements. If the change is complex, the programming supervisor creates a detailed level specification of the change request for the developers. Change management changes are tracked through the IB Release system. The IB Release system tracks who requested the change, who approved the change, and the person who acknowledged the change. The change management approver reviews the modification of code in an IBG test environment and approved changes are sent to the production queue. Larger and more critical changes are selected for additional Quality Assurance testing. Changes are outlined in an accompanying IB Release Report and are scrutinized by senior programmers and tested before being released. Privileged access to IB Release is appropriate. Only authorized personnel have the ability to approve and release changes.

Controls exist to confirm that changes that have been moved into the production environment have been appropriately approved by management. If a change is made without approval or done outside of the System Change Management Process, the change appears on the Detective Control Match Report and a senior application manager is notified by email that there are unapproved changes requiring review. The Detective Control Match Report is cumulative with open items remaining on the report (and to applicable managers by email) until the release is performed through the IB Release process or the artifact is removed.

Network, Operating System and Database

The Network Operations group obtains approval before modifying and changing network security parameters made to firewalls. Firewall change requests are submitted through e-mail. Requests are reviewed by the Network engineering group manager or the system administrator manager for completeness and risk assessment. Once approved, either the Network engineering group manager or the system administrator implements the change.

Network issues that require changes to the network and network infrastructure (e.g., network configuration changes, network software patch upgrades, and network infrastructure upgrades) are requested by the Network Operations group. Network Operations engineers discuss and define the requirements and designs with the Director of IT and ultimately the CIO for approval with involvement from key stakeholders including personnel from the Product Engineering group, Hardware Support group, Operations group, Cabling group, and Circuit Vendors. Network change requests are presented to the CIO either by e-mail or verbally in the weekly Steering Committee meeting for approval.

The decision to upgrade and/or make changes to system software based on patches provided by the vendor is up to the System Administration team. Prior to implementation in production, patches are installed in a non-production environment to help ensure that it does not affect the existing processing environment. The testing and status of implementation to production is documented within the ticket. The ticket is actively monitored by IT management, and verbal approval is obtained through regular discussions during the lifecycle of each change. An IBWeb application enables servers to be patched by the system in batches. The ability to release a patch is limited to only authorized personnel within the system administrator group. The system pulls the patches from a central repository that can only be updated by the System Administrator.

Complementary Subservice Organization Controls

IBG uses Equinix to provide colocation data center services for the Company's servers and Iron Mountain for backup tape storage services. These two have been identified as subservice organizations for this report. The description includes only the control objectives and related controls of IBG and excludes the control objectives and related controls of the subservice organization. Therefore, the subservice organizations' control environment must be evaluated in conjunction with IBG's controls and the related tests and results described in Section IV of this report, taking into account the related complementary subservice organization controls expected to be implemented at the subservice organization, as listed below:

Subservice Organization	Applicable Control Objectives
Equinix is responsible for ensuring that physical access control systems are in place to restrict access to and within the data centers housing critical infrastructure components.	Control Objective O
Equinix is responsible for ensuring data center badge access requests require a completed badge access request form completed and approved by appropriate personnel prior to the granting of access	Control Objective O
Equinix is responsible for ensuring data center badge access is revoked in a timely manner for personnel when physical access is no longer required at their data centers.	Control Objective O
Equinix is responsible for ensuring that effective environmental control and monitoring equipment are in place at their data centers including fire detection and suppression systems, HVAC units, power generators, and electrical systems.	Control Objective O
Iron Mountain is responsible for storing backup files in a complete and accurate matter as well as presenting backup files when needed for restoration.	Control Objective N

Complementary User Entity Controls

The controls at IBG LLC relating to Brokerage Operations cover only a portion of the overall internal control for each user entity. The Company's processes and controls were designed with the assumption that certain controls would be implemented by their user entities. The user entity's internal control also forms part of the overall control environment and must be evaluated in conjunction with the Company's controls summarized in Section IV. In certain situations, the application of specific controls by the user entity is necessary to achieve certain control objectives included in this report.

This section highlights those internal control responsibilities that the Company believes should be present for each customer and has considered in developing its controls described in this report. For user entities to rely on the controls reported on herein, each user entity must evaluate their own internal control to determine if the following procedures are in place. Furthermore, the following list of controls is intended to address only those controls surrounding the interface and communication between each user entity and the Company. Accordingly, this list does not purport to be and is not a complete listing of the controls which provide a basis for the assertions underlying the financial statements of each user entity. The user entity should consider whether the following controls have been placed in operation at their organizations.

User Entity Controls	Applicable Control Objectives
<u>Account Administration</u> User entities should ensure that changes to their accounts are approved when required in order for the change to be applied to their account.	Control Objective A
<u>Trade Activity</u> User entities should ensure that all trades are entered completely and accurately. User entities are also responsible for creating appropriate passwords to gain access to the Trader Work Station (TWS).	Control Objective C
<u>Indicative Data Changes</u> User entities should: <ul style="list-style-type: none"> • Ensure that all indicative data is authorized, accurate, complete, and formatted correctly. • Provide complete and up-to-date addresses to IBG. • Ensure that all price statements are accurate. 	Control Objective K
<u>Online Reporting</u> User entities should ensure that they view electronic statements and confirmations and raise issues/concerns to IBG in a timely manner.	Control Objective M
<u>Information Security</u> User entities should ensure only authorized individuals have access to enter, modify, or view transactions or indicative data on their online account.	Control Objective O

Section IV

Description of IBG LLC's Control Objectives and Related Controls, Independent Service Auditor's Tests of Controls, and Results of Tests

Purpose and Objectives of the Report

This report is intended to provide users of IBG LLC's ("Company" or "IBG") brokerage operations system (System) with information that may be useful when assessing the risks arising from interactions with the Company's system, particularly information about system controls that the Company has designed, implemented, and operated to achieve the related control objectives stated in the description, based on the criteria identified in IBG's assertion.

CliftonLarsonAllen LLP's ("our" or "we") examination was limited to those controls associated with the Company's brokerage operations system and did not extend to procedures that may be in effect at user entities. In addition, the scope of the report is limited to the Company's brokerage operations system and does not include any other services offered by the Company. We examined the Company's description of its brokerage operations system titled, "Description of IBG LLC's Brokerage Operations System," throughout the period January 1, 2021 to December 31, 2021, 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 IBG's assertion.

It is each user entity's responsibility to evaluate this information in relation to the controls in place at each user entity. If certain complementary controls are not in place at the user entity, the Company's controls may not compensate for such weakness. Refer to Section III of this report for further documentation over complementary user entity controls that should be in place at user entities.

Tests of Operating Effectiveness

Our tests of the operational effectiveness of controls were designed to cover a representative number of transactions throughout the period of January 1, 2021 to December 31, 2021, for each of the controls listed in this section, which are designed to achieve the related control objectives stated in the description, based on the criteria identified in IBG's assertion. In selecting particular tests for the operational effectiveness of controls, we considered (a) the nature of the items being tested, (b) the types of available evidential matter, (c) the nature of the audit objectives to be achieved, (d) the assessed level of control risk, and (e) the expected efficiency and effectiveness of the test. We performed our tests of operational effectiveness of controls through a mixture of inquiry, observation, inspection, and reperformance, which are further defined below in the following table:

Test	Description
Inquiry	Made inquiries of management and corroborated responses with appropriate personnel and documentation to ascertain whether the controls were implemented and operating as described.
Observation	Observed the application or existence of specific control activities to ascertain whether the controls were implemented and operating as described.
Inspection	Inspected documents and other support including policies, reports, spreadsheets, checklists, and system settings to ascertain whether the controls were implemented and operating as described, and that relevant reviews, audits, or approvals were applied consistently.
Reperformance	Re-performed or simulated the operation or application of the control policy, procedure, or system feature associated with the control activity to ascertain whether the controls were implemented and operating as described.

Procedures for Assessing Completeness and Accuracy of Information Provided by the Entity (IPE)

For tests of controls requiring the use of IPE (e.g., controls requiring system generated populations for sample based testing), we performed a combination of the following procedures where possible based on the nature of the IPE to address the completeness, accuracy, and data integrity of the data or reports used: (1) inspect the source of the IPE, (2) inspect the query, script, or parameters used to generate the IPE, (3) tie data between the IPE and the source, and/or (4) inspect the IPE for anomalous gaps in sequence or timing to determine the data is complete, accurate, and maintains its integrity. In addition to the above procedures, for tests of controls requiring management's use of IPE in the execution of the controls (e.g., periodic reviews of user access listings), we inspect management's procedures to assess the validity of the IPE source and the completeness, accuracy, and integrity of the data or reports.

Control Objective A. Account Administration

Controls provide reasonable assurance that new account setup and modifications to existing accounts are authorized and processed accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
A:1	New customers complete a customer application and will provide or upload required information into the CAST System, which include personal information, financial qualifications (income, liquid assets, net worth), product knowledge, and trading objectives. CAST is used to track the application process and retain the required documentation. Verification of the provided information will be completed by the system. The application is then reviewed and approved by the Company within two business days prior to the account opening to ensure that information verification protocols and other required tasks were completed.	<p>Inquired of the SVP of Client Services responsible for ensuring that customer applications are reviewed, and that verification protocols and other required tasks are completed 2 days prior to the account opening.</p> <p>For a sample of new customers taken from a list generated from the Company's CAST system, inspected the corresponding new customer application processed within the CAST system to determine whether the verification of the submitted information occurred and whether the customer application was reviewed and approved by an authorized IBG employee within two business days prior to the account opening.</p> <p>Observed the imputation of data sets used to generate the listing of new customers from the CAST system to determine whether all new customers were included in the system generated listing.</p>	No exceptions noted.
A:2	Modifications to existing accounts, including changes to the mailing address, phone number, email address, taxID, and bank information, must be changed manually by the customers when they log into their account. An automated email will be sent to customers participating in the 2-factor authentication Secure Login System, notifying the customer that the change(s) have been processed and notifying them to contact the Company if they cannot confirm that the change was made on their end. If the customer does not participate in the Company's 2-factor authentication Secure Login System, the Company sends an email asking the customer to review and confirm the changes they made. The customer must then confirm the changes by logging into the website and indicating their approval. Account changes are made within two business days upon submission and approval from the customer.	<p>Inquired of the SVP of Client Services responsible for ensuring that modifications to existing accounts are accompanied by either a confirmation email sent to the customer or an email requesting that the customer review and confirm the change.</p> <p>For a sample of customer account modifications taken from a list generated from the Company's CAST system, inspected the change confirmation logs and email communications to determine whether an email was generated and communicated to the customer either to confirm that the requested change was processed or requesting the customer to confirm and approve the change in the system prior to its processing.</p> <p>For a sample of customer account modifications taken from a list generated from the Company's CAST system, inspected the change confirmation logs to determine whether the change was made within two business days upon submission and approval from the customer.</p> <p>Observed the imputation of data sets used to generate the listing of customer account modifications from the CAST system to determine whether all customer account modifications were included in the system generated listing.</p>	No exceptions noted.

Control Objective B. Trading Product Setup and Modification

Controls provide reasonable assurance that new trading products and changes to trading products are authorized and established in a complete, accurate, and timely manner.

Control Activity		Testing performed	Results of Testing
B:1	<p>On a daily basis, files are automatically uploaded to the IB Reference Database system using feeds from various external sources including data providers and exchanges. The uploaded files include both new and updated trading product information.</p> <p>For products that have only one source, rules have been created to help ensure the integrity of the data. In addition, when there are multiple sources for a trading product, the system performs a comparison between the information in the various feeds. Data feed breaks and differences between feed sources are automatically compiled in daily exception reports.</p> <p>The breaks and differences identified within the exception reports are further reviewed by the assigned Operator. If deemed necessary, corrective action is taken and the changes are re-validated within the IB Reference Database system.</p>	<p>Inquired of the Software Engineer Manager responsible for ensuring that daily exception reports detailing data feed breaks and difference between feed sources are compiled, reviewed, and that correction actions are made if needed.</p> <p>For a sample of dates, inspected the corresponding exception report to determine whether identified breaks were further reviewed, and that corrective action was taken to resolve the breaks.</p>	No exceptions noted.

Control Objective C. Trading

Controls provide reasonable assurance that trades are received from an authorized source.

Control Activity		Testing performed	Results of Testing
C:1	<p>Trades are requested by customers through IBG's electronic trading system and fed in to IBG in real-time. The following security measures have been put into place by IBG to ensure that only authorized customers can submit requests for trades:</p> <ul style="list-style-type: none">• Users must have a unique username and password, with passwords being:<ul style="list-style-type: none">◦ 8 Characters in Length.◦ Must contain a mixture of upper and lowercase letters and numbers.• Multi-factor authentication using a SecureID token.	<p>Inquired of the Compliance & Regulatory Liaison responsible for ensuring that securing measures, including passwords and multi-factor authentication, have been put into place to ensure only authorized customers can submit requests for trades.</p> <p>Observed the Trader Work Station system login process for a sample of users to determine whether the users are required to enter a user ID, password and secure token code when accessing the system.</p> <p>Inspected the Trader Work Station password parameters to determine whether passwords must be at least 8 characters in length and contain a mixture of upper and lowercase letters and numbers.</p>	No exceptions noted.

Control Objective D. Clearing

Controls provide reasonable assurance that trades are cleared, and breaks are identified and resolved accurately, completely, and in a timely manner.

Control Activity		Testing performed	Results of Testing
D:1	<p>On a daily basis, an automated comparison of trades that are recorded in the Company's clearing systems are performed with those reported by the clearinghouses. Various clearing houses are matched in real time with exceptions appearing on the Real Time Trade Match (RTTM) queue.</p> <p>Throughout the trading day, trades that do not match appear on the RTTM queue, which is reviewed by Clearing Operations Department personnel, who analyse the cause for each break and attempt to resolve them.</p> <p>At the end of the day, RTTM reports are created detailing all breaks that were not resolved during the day. The Clearing Operations Department operator's designated Supervisor will then review and approve the reports to verify that all outstanding breaks detail a comment stating the reason for the break.</p>	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that the Real Time Trade Match reports are created detailing all breaks that are not resolved during the day and that it is reviewed by the designated Supervisor to ensure that all outstanding breaks detail a comment stating the reason for the break.</p> <p>For a sample of dates and trade breaks taken from a list generated from IBWeb, inspected the corresponding current and next day RTTM report to determine whether the RTTM report was reviewed by the Supervisor, the reason for the break was documented, and that the trade break was resolved.</p> <p>Observed the imputation of data sets used to generate the listing of trade breaks from IBWeb to determine whether all trade breaks were included in the system generated listing.</p>	No exceptions noted.
D:2	<p>On a monthly basis, the RTTM reports are reviewed and signed off by the VP of Clearing Operations to ensure that any unresolved breaks were researched, remediated and that all required approvals for the month were documented and retained.</p>	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that the Real Time Trade Match reports are reviewed on a monthly basis to ensure that any unresolved breaks were researched, remediated, and that all required approvals for the month were documented and retained.</p> <p>For a sample of months, obtained and inspected the corresponding RTTM report to determine whether it was reviewed and signed off by the VP of Clearing Operations to ensure that all aged items appearing on the report have been sufficiently researched and remediated.</p>	No exceptions noted.

Control Objective E. Settlement

Controls provide reasonable assurance that cash and security positions are reconciled completely, accurately, and on a timely basis with custodians and depositories.

Control Activity		Testing performed	Results of Testing
E:1	On settlement date +1, Clearing Operations Department personnel perform a comparison between clearing houses and IBWeb's anticipated securities and cash to be received. Breaks are identified, documented, researched within the Settlement Difference Report and monitored to completion by Clearing Operations Department personnel. On a daily basis, the Settlement Difference Reports are signed off by the Clearing Operations Department personnel's designated Supervisor to verify that all breaks were identified, documented, and further researched.	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that daily Settlement Difference Reports are signed off by the designated Supervisor to verify that breaks are identified, documented, and further researched.</p> <p>For a sample of dates, inspected the corresponding Settlement Difference Report to determine whether it was signed off by the designated Supervisor and that the breaks were identified, documented and further researched by the Clearing Operations Department.</p>	No exceptions noted.
E:2	On a monthly basis, the reconciliation of control accounts, for which the Settlement Difference Reports are inclusive, are created and reviewed by the VP of Clearing Operations to ensure that all outstanding breaks have been resolved if able to be and that any remaining breaks have a valid explanation documented.	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that a monthly review of the Settlement Difference Reports is completed to ensure that all outstanding breaks have been resolved if able to be and that any remaining breaks have a valid explanation documented.</p> <p>For a sample of months, inspected the corresponding Settlement Difference Report to determine whether it was reviewed and signed off by the VP of Clearing Operations to ensure that all outstanding breaks have been resolved if able to be and that any remaining breaks have a valid explanation documented.</p>	No exceptions noted.
E:3	On a daily basis, Clearing Operations Department personnel track broker-to-broker fails to resolution using the Broker-to-Broker Fails Report from the Inventory Management System. Any aged broker-to-broker fails are reviewed and confirmed on a quarterly basis with the counterparty and tracked to resolution.	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that on a daily basis, Clearing Department personnel track broker-to-broker fails to resolution using the Broker to Broker Fails Report and that any aged broker-to-broker fails are reviewed and confirmed, on a quarterly basis, with the counterparty and tracked to resolution.</p> <p>For a sample of quarters, inspected the quarterly aged Broker-to-Broker Fails Report to determine whether each failure is tracked until resolution and communications are sent to counterparties notifying them of the reason for the failure and tracked to resolution.</p>	No exceptions noted.

Control Objective F. Stock Record Reconciliation and Control

Controls provide reasonable assurance that position out-of-balances are identified, aged, and resolved accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
F:1	On a daily basis, position differences between the depositories and the Company's books and records that are automatically calculated and reported within Position Difference Reports are reviewed by clearing personnel to ensure that all breaks were further researched. Position Difference Reports are cumulative with breaks remaining on the report until resolution. The Position Difference Reports are reviewed daily by a designated Supervisor to ensure that all breaks were identified and that a corresponding explanation for the break was documented.	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that Position Difference Reports, detailing position differences between the depositories and the Company's books and records, are reviewed daily to ensure that all breaks were identified and that a corresponding explanation for the break was documented.</p> <p>For a sample of dates and position differences taken from a list generated from IBWeb, inspected the corresponding position difference report to determine whether it was reviewed and approved by the designated Supervisor to ensure that the position break was identified and that a corresponding explanation for the break was documented.</p> <p>Observed the imputation of data sets used to generate the listing of position differences from IBWeb to determine whether all position differences were included in the system generated listing.</p>	No exceptions noted.
F:2	On a monthly basis, Position Difference Reports are reviewed and electronically signed off by the VP of Clearing Operations within the Centralized Position Reconciliation system to ensure that any outstanding aged breaks were researched and remediated and that all required approvals for the month were documented and retained.	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that Position Difference Reports are reviewed on a monthly basis to ensure that any outstanding aged breaks were researched and remediated and that all required approvals for the month were documented and retained.</p> <p>For a sample of months and position differences taken from a list generated from IBWeb, inspected the corresponding Position Difference Report to determine whether it was reviewed and signed off by the VP of Clearing Operations to ensure that any outstanding aged breaks were researched and remediated.</p> <p>Observed the imputation of data sets used to generate the listing of position differences from IBWeb to determine whether all position differences were included in the system generated listing.</p>	No exceptions noted.
F:3	Physical securities are kept in a safe and access is restricted to authorized individuals from the Credit Department.	<p>Inquired of Internal Audit responsible for ensuring that physical securities are kept in a safe and that access is restricted to authorized individuals from the Credit Department.</p> <p>Observed the safe used to stored physical securities to determine whether the physical securities are securely stored and that access to them is restricted.</p>	No exceptions noted.

Control Objective F. Stock Record Reconciliation and Control

Controls provide reasonable assurance that position out-of-balances are identified, aged, and resolved accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
F:4	The vault of physical securities is maintained by the Credit Department. The Clearing Operations Department tracks the positions in the vault via the "Vault Balance Report". On a quarterly basis, someone independent of the Clearing Operations Department verifies that the Vault Balance Report reconciles to the certificates maintained in the vault. Discrepancies are documented, researched and resolved.	<p>Inquired of Internal Audit responsible for ensuring that on a quarterly basis, someone independent of the Clearing Operations Department verifies that the Vault Balance Report reconciles to the certificates maintained in the vault and that discrepancies are documented, researched, and resolved.</p> <p>For a sample of quarters, inspected the corresponding Vault Balance Report to determine whether the reconciliation was performed by a person independent of the Clearing department to verify that the Report reconciles to the certificates maintained in the vault and that discrepancies are documented, researched, and resolved.</p>	No exceptions noted.

Control Objective G. Corporate Actions - Dividends

Controls provide reasonable assurance that announcement information is received from an authorized source and recorded and that payments received for interest and dividends are processed accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
G:1	On a daily basis, dividend announcement information is uploaded using an automated feed from external vendors (Telekurs and Bloomberg). The Company calculates the expected dividend to be paid based on the announcement details that are received. The Dividend Reconciliation System compares the internally calculated dividend payments with the payments received in the Company's accounts at the depository. Differences are researched and resolved in a timely manner by Corporate Actions Department personnel.	<p>Inquired of the VP of Clearing Operations responsible for ensuring that the Dividend Reconciliation System compares the internally calculated dividend payments with the payments received in the Company's accounts at the depository and that differences are researched and resolved in a timely manner.</p> <p>For a sample of dates, inspected the completed corresponding Dividend Reconciliation System results to determine whether a reconciliation of internally calculated dividend payments with the payments received in the Company's accounts at the depository and that differences were further researched and resolved by the next business day.</p>	No exceptions noted.
G:2	On dividend payment date, Corporate Actions Department personnel collect and reconcile funds received from custodians/agents to confirm that funds due to the Company are received. On a monthly basis, reports of unresolved breaks for payment reconciliations are generated by the Dividend System and sent to Corporate Actions management for further review to ensure that breaks are further investigated.	<p>Inquired of the VP of Clearing Operations responsible for ensuring that on a monthly basis, reports of unresolved breaks for payment reconciliations are generated and reviewed to ensure that the breaks were further investigated.</p> <p>For a sample of months, inspected the corresponding payment reconciliation report to determine whether the report was reviewed and signed off by Corporate Actions management to ensure that all breaks were resolved prior to the completion of the review.</p>	No exceptions noted.
G:3	Corporate Actions personnel compare details for mandatory reorganization announcements received from the authorized vendor with other sources (e.g., depositories, other vendors, company's website, and prospectus). Once reorganization event details have been confirmed and approved, the events are processed in the Corporate Action System on the same day.	<p>Inquired of the VP of Clearing Operations responsible for ensuring that Corporate Actions personnel compare details for mandatory reorganization announcements received from the authorized vendor with other sources and once approved, the events are processed in the Corporate Action System on the same day.</p> <p>For a sample of mandatory reorganization announcements taken from a list generated from IBWeb, inspected the corresponding log from IBWeb to determine whether the associated terms of the mandatory reorganization announcement were tracked, compared, and was approved by designated Corporate Actions personnel.</p> <p>For a sample of a mandatory reorganization announcements taken from a list generated from IBWeb, inspected the corresponding log to determine whether the system automatically applied the event to the correct affected account and reflected on the customer's statement in an accurate and timely manner.</p> <p>Observed the imputation of data sets used to generate the listing of mandatory reorganization announcements from IBWeb to determine whether all mandatory reorganization announcements were included in the system generated listing.</p>	No exceptions noted.

Control Objective G. Corporate Actions - Dividends

Controls provide reasonable assurance that announcement information is received from an authorized source and recorded and that payments received for interest and dividends are processed accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
G:4	Customers receive notification of upcoming voluntary reorganizations through the Trader Work Station and can choose to participate through Account Management. Corporate Actions System tracks customers who elect to participate in voluntary elections. On the effective date, Corporate Actions Department personnel will review the customer accounts to ensure that customer elections were applied within the Corporate Actions System in an accurate and timely matter.	<p>Inquired of the Corporate Actions Manager responsible for ensuring that Corporate Actions Department personnel will review the customer accounts to ensure that customer elections were applied within the Corporate Actions System in an accurate and timely matter.</p> <p>For a sample of voluntary reorganization announcements taken from a list generated from IBWeb, inspected the corresponding log from IBWeb to determine whether the voluntary reorganization was reviewed to ensure that there was an accurate and timely update on the effective date.</p> <p>For a sample of voluntary reorganization announcements taken from a list generated from IBWeb, inspected the corresponding log from IBWeb to determine whether the system automatically applied the event to those who elected to participate in the voluntary reorganization and that it was reflected on the customer's statement in an accurate and timely manner.</p> <p>Observed the imputation of data sets used to generate the listing of voluntary reorganization announcements from IBWeb to determine whether all voluntary reorganization announcements were included in the system generated listing.</p>	No exceptions noted.
G:5	On a monthly basis, Corporate Actions management reviews and signs off on the Corporate Actions Reports detailing balances of operating ledgers including unallocated Corporate Actions. Differences from the Open Payable/Receivable files are resolved accurately, completely and timely with the use of detailed files received from the clearinghouses.	<p>Inquired of the Corporate Actions Manager responsible for ensuring that on a monthly basis, Corporate Actions management reviews and signs off on the Corporate Actions Reports to ensure that differences are resolved accurately, completely, and timely.</p> <p>For a selection of months, inspected the corresponding corporate action report to determine whether it was reviewed and signed off by Corporate Actions management to ensure that identified differences were resolved in an accurate, complete, and timely manner.</p>	No exceptions noted.

Control Objective H. Customer Margin

Controls provide reasonable assurance that margin accounts are monitored to confirm liquidations are performed accurately, completely, and in a timely manner.

Control Activity		Testing performed	Results of Testing
H:1	Customer accounts are monitored in real time and if the customer accounts fall below regulatory margin requirements, IBG's systems will automatically liquidate positions necessary to bring the account back into compliance. The liquidation trades will be reflected in the customer's statement on the following day.	<p>Inquired of the Senior Risk Manager responsible for ensuring that IBG's systems will automatically liquidate positions necessary to bring the account back into compliance and that liquidation trades will be reflected in the customer's statement on the following day.</p> <p>Observed the Liquidation Monitoring System (LiqMon) to determine whether customer accounts are monitored in real time and customer positions are automatically liquidated to bring the account back into compliance in the event that a customer account falls below the regulatory margin requirement and are reflected in the customer's statement on the following day.</p>	No exceptions noted.
H:2	On a daily basis, risk personnel monitor the Summary of Liquidation Disabled Accounts Report showing customer accounts in which the automatic liquidation function has been disabled. Management monitors the report and ensures that an explanation is provided for the liquidation disable status. Management also reviews the liquidation disabled account to determine whether there are circumstances or events that would require them to reconsider the liquidation disable status (account exclusion).	<p>Inquired of the Senior Risk Manager responsible for ensuring that on a daily basis, risk personnel monitor the Summary of Liquidation Disabled Accounts Report to ensure that an explanation is provided for the liquidation disable status as well as to determine whether there are circumstances or events that would require them to reconsider the liquidation disable status.</p> <p>For a sample of days, inspected the corresponding summary of liquidation disabled accounts report to determine whether the corresponding liquidation disabled accounts were removed from the Liquidation Disabled Accounts Report and that an explanation was documented describing the reason the account was disabled.</p>	No exceptions noted.

Control Objective I. Net Capital

Controls provide reasonable assurance that the aggregate monthly net capital number matches to the number reported to the Canadian regulators on a monthly basis.

Control Activity		Testing performed	Results of Testing
I:1	On a monthly basis, the Regulatory Reporting Department performs a reconciliation between the daily net capital estimate for the last business day of the month and the Investment Industry Regulatory Organization of Canada (IIROC) Report for the Canadian regulators IIROC MFR report. The reconciliation is further reviewed to ensure its accuracy and completeness and that any variances on the monthly reconciliation are researched and resolved.	<p>Inquired of the Manager of Financial Compliance responsible for ensuring that a monthly reconciliation between the daily net capital estimate and the IIROC Report is performed to ensure its accuracy, completeness, and that any identified variances are researched and resolved.</p> <p>For a sample of months, inspected the corresponding reconciliation between the daily net capital estimate and the IIROC Report to determine whether the reconciliation was reviewed by senior management to ensure its accuracy and completeness and that any variances on the monthly reconciliation are researched and resolved.</p>	No exceptions noted.
I:2	On a monthly basis, personnel from the Regulatory Reporting Group creates the Investment Industry Regulatory Organization of Canada (IIROC) Report for the Canadian regulators. The compiled IIROC Report is reviewed to ensure that the numbers reported match to the final month end balance sheet and that variances are researched and resolved.	<p>Inquired of the Manager of Financial Compliance responsible for ensuring that on a monthly basis, the IIROC is compiled and reviewed to ensure that the numbers reported match to the final month end balance sheet and that variances are researched and resolved.</p> <p>For a sample of months, inspected the corresponding IIROC Net Capital Report to determine whether the Report was reviewed to ensure that the net capital submitted was consistent with the numbers reported in the month end balance sheet and that any differences were further researched and resolved.</p>	No exceptions noted.

Control Objective J. Funds Processing (Checks and Wires)

Controls provide reasonable assurance that fund receipts are authorized and processed timely, accurately, and completely.

Control Activity		Testing performed	Results of Testing
J:1	<p>On a daily basis for checks, the Cashiering Group scans customer check deposits and assigns appropriate IBG customer account numbers electronically. The check file is automatically loaded into the IBWeb cashiering system where check images are stored. The transactions automatically move to the unapproved entries queue for authorization/approval by the designated IBWeb cashiering system approver. The evidence of approval is retained in the IBWeb cashiering system.</p> <p>On a daily basis, for both checks and wires, deposits are matched against deposit notifications that are entered by the IBG customer in account management. If the deposit received matches the terms of the deposit notification, the funds are automatically applied to the customer's account. For unmatched items, they are researched and resolved in a timely manner.</p>	<p>Inquired of the Cashiering Manager responsible for ensuring that daily check and wire deposits are reviewed and approved to ensure that funds are matched and applied to the customer's account and that unmatched funds are researched and resolved in a timely manner.</p> <p>For a sample of dates and check deposits taken from a list generated from the IBWeb system, inspected check deposit images and IBWeb Cashiering System to determine whether approval from an appropriate individual was obtained and documented.</p> <p>For a sample of dates, as well as check and wire deposits take from a list generated from IBWeb, inspected IBWeb Cashiering System and IBG customer accounts to determine whether each deposit was validated against the deposit notification and automatically applied to the customer's account, with unmatched items further researched and resolved in a timely manner.</p> <p>Observed the imputation of data sets used to generate the listing of check and wire deposits from IBWeb to determine whether all check and wire deposits were included in the system generated listing.</p>	No exceptions noted.
J:2	<p>The suspense items over two weeks old report detailing aged items (checks and wires) is available online for personnel each day and printed and provided to management on a weekly basis. The "evidence of supervisory review by senior management" report is used to evidence the review of the suspense items which is signed off by the Treasurer.</p>	<p>Inquired of the Cashiering Manager responsible for ensuring that the suspense items over two weeks old report is reviewed to ensure that aged suspense items are further investigated.</p> <p>For a sample of weeks, inspected the corresponding suspense items over two weeks old report to determine whether suspense items were reviewed and signed off by the Treasurer to ensure all aged suspense items were further investigated.</p> <p>For a sample of weeks, inspected the corresponding suspense items over two weeks old report to determine whether the reported aged suspense items were investigated, as evidenced via documented notes annotated within the report.</p>	No exceptions noted.

Control Objective J. Funds Processing (Checks and Wires)

Controls provide reasonable assurance that fund receipts are authorized and processed timely, accurately, and completely.

Control Activity		Testing performed	Results of Testing
J:3	<p>Disbursement requests are entered by customers directly online through account management. On a daily basis, IBG confirms the availability of funds and only send funds to the name and address on file for checks and approved banking instructions for wires.</p>	<p>Inquired of the Cashiering Manager responsible for ensuring that on a daily basis, IBG confirms the availability of funds and only send funds to the name and address on file for checks and approved banking instructions for wires.</p> <p>Observed a wire disbursement being processed to determine whether the IBWeb Cashiering System performed a check to confirm the availability of funds and the destination matched the records setup by the customer.</p> <p>For a selection of dates and disbursement requests taken from a list generated from the IB Web system, inspected the IBWeb Cashiering System database information and customer account records to determine whether the IBG system confirmed the availability of funds and only send funds to the name and address on file for checks and approved banking instructions for wires.</p> <p>Observed the imputation of data sets used to generate the disbursement requests from IBWeb to determine whether all check and wire deposits were included in the system generated listing and were processed within seven business days upon completion of the required documentation.</p>	No exceptions noted.
J:4	<p>For manual check requests, Cashiering personnel confirm that checks have been authorized by the appropriate level of senior management and confirm the signatures of the approvers. (Two signers are required for check withdrawals). The request is then forwarded to the Accounts Payable department where the check is created. Checks are processed within seven business days once required documentation is completed.</p> <p>Customer wire withdrawals manually entered by Cashiering are subject to dual approval by the appropriate signatories within the swift application on the day they are entered. If the disbursed funds are being sent to an outside party/different bank information/different address that is different from what is on file, additional approval is needed.</p>	<p>Inquired of the Cashiering Manager responsible for ensuring that manual checks and wire requests are confirmed to have been authorized by appropriate personnel prior to their processing.</p> <p>For a sample of manual check and wire disbursements taken from a list generated from IBWeb, inspected the corresponding manual disbursement documentation to determine whether manual check and wire disbursements have appropriate documentation evidencing appropriate approval and were processed in an accurate, complete and timely manner.</p> <p>Observed the imputation of data sets used to generate the listing of manual check and wire disbursements from IBWeb to determine whether all manual check and wire disbursements were included in the system generated listing and were processed within seven business days upon completion of the required documentation.</p>	No exceptions noted.

Control Objective J. Funds Processing (Checks and Wires)

Controls provide reasonable assurance that fund receipts are authorized and processed timely, accurately, and completely.

Control Activity		Testing performed	Results of Testing
J:5	For disbursements and receipts, Cashiering reviews the "cashiering reconciliation report" on a daily basis. This report displays unmatched entries between the IBWeb cashiering system and the bank which includes debit card transactions. Cashiering and accounting personnel review the differences and resolve any unreconciled items.	<p>Inquired of the Cashiering Manager responsible for ensuring that the cashiering reconciliation report is reviewed to ensure that differences between unmatched entries between the IBWeb Cashiering System and the bank are reviewed and resolved.</p> <p>For a selection of dates, inspected the corresponding cashiering reconciliation report and underlying disbursement support to determine whether the cashiering reconciliation report was reviewed by the cashiering and accounting team to ensure that unreconciling items were resolved.</p>	No exceptions noted.

Control Objective K. Pricing

Controls provide reasonable assurance that prices are received from an authorized source and are recorded accurately, completely, and timely.

Control Activity		Testing performed	Results of Testing
K:1	On daily basis, pricing feeds are received to an IBG secured FTP site from authorized pricing vendors. On a daily basis, pricing personnel in the technical clearing operations group review the generated missing closing price report and will first search for a price using a Bloomberg terminal or, if a price is still unavailable, search for a price from a pricing website. If after two days the price is still missing from the authorized pricing feeds, they will contact the authorized pricing vendors in order to inquire about the missing price(s). If a price cannot be obtained from the authorized vendors utilized by IBG, pricing personnel obtain missing prices from outside vendors.	<p>Inquired of the Global Manager – Technical Clearing Operations responsible for ensuring that the daily missing closing price report is generated and reviewed to ensure that missing prices are updated in an accurate and timely matter.</p> <p>For a sample of dates, inspected the missing closing price report to determine that missing prices were researched by the technical clearing operations group (TOPS) and were resolved in a complete, accurate, and timely manner.</p>	No exceptions noted.
K:2	On a daily basis, the IBWeb statement system determines the PnL of all customer accounts. The system analyzes each statement for excessive PnL. For accounts that exceed the tolerance, clearing operations will conduct a review of the identified accounts to determine if the PnL was caused by a pricing error and will take corrective action. The review of the COB PnL summary is performed prior to the day's customer statements being generated.	<p>Inquired of the Global Manager – Technical Clearing Operations responsible for ensuring that accounts that exceed the PnL tolerance are further reviewed and that correction items are conducted prior to the generation of the day's customer statements.</p> <p>For a sample of dates, inspected the COB PnL summary report to determine whether accounts that exceed the PnL are reviewed prior to the daily customer statements being generated to verify if it was caused by a pricing error and that corrective action was taken.</p>	No exceptions noted.

Control Objective L. Account Transfers

Controls provide reasonable assurance that account transfers are authorized and processed completely, accurately, and timely.

Control Activity		Testing performed	Results of Testing
L:1	<p>Account transfers are processed by the clearing system which automatically matches indicative information with the counterparty. Securities included in incoming account transfers are run through the credit manager system to see if the securities are recognized by the Company's systems and if the level of margin is allowable for each. If the securities are not recognized, the account transfer will automatically be rejected. Outbound account transfers are also analyzed and authorized by the Credit Manager to see if the transfer results in a negative equity balance. If the transfer would result in a negative equity balance, the account transfer would be rejected. Transfers are settled within 5 business days of the initiation unless rejected.</p>	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that account transfers are processed within 5 business days by the clearing system which automatically matches information with the counterparty and if securities are not recognized or results in a negative equity balance, the account transfer will be rejected.</p> <p>For a sample of inbound and outbound account transfers taken from a list generated from IBWeb, inspected corresponding supporting documentation to determine whether transfer information was entered and settled in a complete and accurate manner within 5 business days of the initiation and for outbound transfers, that it was reviewed to ensure whether the transfer results in a negative equity balance.</p> <p>Observed an instance of a rejected inbound account transfer to determine whether the account was automatically rejected by the system when the underlying securities were not recognized.</p> <p>Observed the imputation of data sets used to generate the listing of inbound and outbound account transfers from IBWeb to determine whether all inbound and outbound account transfers were included in the system generated listing.</p>	No exceptions noted.
L:2	<p>On an as-needed basis, customers enter free of payment (FOP) transfer requests through their account on the Company's website. Each FOP transfer request is automatically processed upon passing credit and validation checks. FOP transfer requests that do not pass the credit and validation check are suspended and re-validated by the system within seven business days once the needed updates are made.</p>	<p>Inquired of the Director of Global Clearing Operations responsible for ensuring that FOP transfer requests are automatically processed upon passing credit and validation checks and that requests whose validation checks have failed are re-validated within seven business days once the needed updates are made.</p> <p>For a sample of inbound and outbound FOP account transfers taken from a list generated from IBWeb, inspected corresponding log to determine whether the transfer request was automatically processed upon passing credit and validation checks. For transfers that didn't pass the test, were revalidated within seven business days.</p> <p>Observed the imputation of data sets used to generate the listing of inbound and outbound FOP account transfers from IBWeb to determine whether all inbound and outbound FOP account transfers were included in the system generated listing.</p>	No exceptions noted.

Control Objective M. Customer Reporting

Controls provide reasonable assurance that account statements reflecting transaction history, interest margin, commissions, and investment balances are complete, accurate and made available to customers in a timely manner.

Control Activity		Testing performed	Results of Testing
M:1	Electronic account statements are automatically created on a daily basis for customers to view online. Batch scheduled jobs are run on a daily basis to generate and update the customer reporting statements. Batched scheduled job fails are monitored, researched and resolved as they occur.	<p>Inquired of the Senior Java Developer responsible for ensuring that electronic account statements are automatically created on a daily basis, batch scheduled jobs are run on a daily basis to generate and update the customer reporting statements, and that batch schedule job fails are monitored, researched, and resolved as they occur.</p> <p>Observed an example of transaction being processed within IBWeb to determine whether a record of the transaction that was processed was automatically processed within the corresponding customer account statement in a complete, accurate manner on the next business day.</p> <p>For a sample of transactions taken from a list generated from IBWeb, inspected the corresponding transaction detail and customer statements to determine whether the account activity was reflected in the customer statements in a complete, accurate manner on the next business day.</p> <p>For a selection of scheduled job fails taken from a list generated from IBWeb, inspected corresponding documentation to determine whether it was monitored, researched and resolved in a complete, accurate manner on the same business day.</p> <p>Observed the imputation of data sets used to generate the listing of schedule job fails and account transactions from IBWeb to determine whether all listing of schedule job fails, and account transactions were included in the system generated listing.</p>	No exceptions noted.
M:2	Customer interest margin is automatically calculated within the IBWeb Retail Equity Clearing System on a daily basis using current underlying market interest rates pulled in automatically within the system. The calculated interest margins will be automatically be reflected in the corresponding customer reporting statement on the following day.	<p>Inquired of the Senior Java Developer responsible for ensuring that customer interest margin is automatically calculated within the IBWeb Retail Equity Clearing System on a daily basis and will be automatically reflected in the corresponding customer reporting statement on the following day.</p> <p>Reperformed the calculation of interest margin to determine whether the system is calculating interest margin in an accurate matter and that the amount is being accurately recorded on the corresponding customer reporting statement.</p>	No exceptions noted.

Control Objective M. Customer Reporting

Controls provide reasonable assurance that account statements reflecting transaction history, interest margin, commissions, and investment balances are complete, accurate and made available to customers in a timely manner.

Control Activity		Testing performed	Results of Testing
M:3	Commission amounts are automatically calculated within the IBWeb Retail Equity Clearing System for each transaction using predefined commission rates agreed upon between the Company and the customer. The calculated commission amounts will be automatically reflected in the customer's statement on the following day.	<p>Inquired of the Senior Java Developer responsible for ensuring that commission amounts are automatically calculated within the IBWeb Retail Equity Clearing System for each transaction using predefined commission rates and that the calculated amounts will be automatically reflected in the customer's statement on the following day.</p> <p>Reperformed the calculation of commissions to determine whether the system is calculating commissions in an accurate matter and that the amount is being accurately recorded on the corresponding customer reporting statement.</p>	No exceptions noted.
M:4	The ability to input new or edit current commission rates housed within the IBWeb Retail Equity Clearing System is limited to designated personnel.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that the ability to input new or edit current commission rates housed within the IBWeb Retail Equity Clearing System is limited to designated personnel.</p> <p>Inspected the user listing generated from IBWeb, along with their associated roles privileges to determine whether the individuals assigned these roles and privileges are limited to the defined designated personnel.</p> <p>Observed the imputation of data sets used to generate the user listing from IBWeb to determine whether all user accounts were included in the system generated listing.</p>	No exceptions noted.

Control Objective N. Network Operations

Controls provide reasonable assurance that scheduled batch jobs, system processing, and data transmissions are authorized, scheduled, and executed in a complete, accurate, and timely manner. Deviations, problems, and errors are identified, tracked, recorded, and resolved in a complete, accurate, and timely manner.

Control Activity		Testing performed	Results of Testing
N:1	On a daily basis, batch and online processing procedures are automatically executed to completion on the clearing job scheduler. Failures are identified and assigned to technical clearing operations specialists for timely review and resolution. Breaks are monitored with the use of the real time clearing job scheduler and appear as open items on the system until resolution.	<p>Inquired of the Global Manager – Technical Clearing Operations responsible for ensuring that batch and online processing procedures are automatically executed to completion on the clearing job scheduler and that failures are identified and assigned to technical clearing operations specialists for timely review and resolution.</p> <p>For a sample of processing failures taken from a list generated from IBWeb, inspected the corresponding clearing job audit trail documentation to determine whether it was assigned to the technical clearing operations specialists and researched and resolved in a timely matter.</p> <p>Observed the imputation of data sets used to generate the listing of processing failures from IBWeb to determine whether all processing failures were included in the system generated listing.</p>	No exceptions noted.
N:2	Access to the clearing job scheduler to activate or deactivate jobs and /or make changes to job orders is restricted and limited to designated personnel.	<p>Inquired of the Global Manager – Technical Clearing Operations responsible for ensuring that access to the clearing job schedule to activate or deactivate jobs and/or make changes to job orders are restricted and limited to designated personnel.</p> <p>Inspected the clearing job scheduler access listing generated from IBWeb to determine whether only authorized users have the ability to activate, deactivate, or make changes to job orders.</p> <p>Observed the imputation of data sets used to generate the clearing job scheduler access listing from IBWeb to determine whether all user accounts were included in the system generated listing.</p>	No exceptions noted.
N:3	Differential backups occur daily and full backups occur weekly. Backups are run to completion as evidenced by an automated email sent from the system to management daily. Backup failures are further researched and resolved as they occur.	<p>Inquired of the Information Security Manager responsible for ensuring that differential backups occur daily and full backups occur weekly with backup failures further researched and resolved as they occur.</p> <p>Inspected the backup settings and configurations to determine whether differential backups occur on a daily basis and that full backups occur on a weekly basis.</p> <p>Inspected an example of a failed backup log to determine that the failure was identified, researched, and resolved by management.</p>	No exceptions noted.

Control Objective O. Information Security

Controls provide reasonable assurance that logical access to programs, data, and computer resources is restricted to authorized and appropriate users, and such users are restricted to performing authorized and appropriate actions.

Control Activity		Testing performed	Results of Testing
O:1	New user access is requested by the new employee's direct manager in the authentication manager system. The request must then be approved by the employee's authentication officer before it is finalized. The authentication management system is a centralized access administration system for IBWeb applications.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that new user access is requested by the new employee's direct manager and approved by the authentication officer prior to access being provisioned.</p> <p>For a sample of new hires taken from a list generated from the payroll system, inspected the corresponding new hire access requests and documentation of approval to determine whether access was appropriately requested and approved by the employee's authentication officer prior to access being granted. Access granted to the new hire was consistent with the access requested and approved.</p> <p>Observed the imputation of data sets used to generate the listing of new hires from the payroll system to determine whether all new hires were included in the system generated listing.</p>	No exceptions noted.
O:2	<p>Access to authentication management applications, UNIX, and the network require a user ID and associated password. These passwords are configured to enforce the following settings:</p> <ul style="list-style-type: none">• At least 8 characters in length.• Complexity requirements (i.e., mixture of upper and lowercase characters, numbers, and symbols).• Passwords must be changed on an annual basis.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that access to authentication management applications, UNIX, and the network require a user ID and associated password.</p> <p>Inspected network, UNIX, and IBWeb password parameters to determine whether configurations, including minimal length, complexity requirements, and password age have been appropriately set up in accordance with Company policy.</p>	No exceptions noted.
O:3	Users are given access to authentication management applications via unique user IDs.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that users are given access to authentication management applications via unique user IDs.</p> <p>Inspected network and IBWeb application user listings generated from the system portals to determine whether user accounts are unique and assigned to an individual and that the account is assigned to an active employee during the report period.</p> <p>Observed the imputation of data sets used to generate the user accessing listings from the network and IBWeb portals to determine whether all user accounts were included in the system generated listing.</p>	No exceptions noted.

Control Objective O. Information Security

Controls provide reasonable assurance that logical access to programs, data, and computer resources is restricted to authorized and appropriate users, and such users are restricted to performing authorized and appropriate actions.

Control Activity		Testing performed	Results of Testing
O.4	When notified of a terminated employee who has system access, HR disables IBWeb access directly in the authentication management system and a checklist is created to track that the access is disabled.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that terminated employees' IBWeb access is disabled when notified and that access is modified accordingly when an employee transfers to a new role.</p> <p>For a sample of terminated employees taken from a list generated from the payroll system, inspected the termination checklist and system access logs to determine whether network and IBWeb access as disabled on the day the selected terminated employee left the Company.</p> <p>Observed the imputation of data sets used to generate the listing of terminations from the payroll system to determine whether all terminations and employee transfers were included in the system generated listing.</p>	No exceptions noted.
O.5	On an annual basis, user access to IBWeb is recertified by designated members of senior management.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that on an annual basis, user access to IBWeb is recertified by designated members of senior management.</p> <p>Inspected the IBWeb application user listing recertification documentation to determine whether designated management has reviewed and recertified the user accounts during the report period, including verifying that roles assigned to each account are appropriate and that no user accounts exist that are assigned to in-active employees.</p>	No exceptions noted.
O.6	For remote access connectivity, employees use Virtual Private Network (VPN) remote access software with 2 factor authentication that encrypts the data transmissions. Only pre-approved active employees should have access to the Company's VPN.	<p>Inquired of the Manager of Network Services responsible for ensuring that for remote access connectivity, employees use VPN remote access software with two factor authentication that encrypts data transmissions.</p> <p>Inspected the VPN user listing generated from the VPN administrator portal to determine whether active unique VPN accounts are assigned to pre-approved employees.</p> <p>Observed the imputation of data sets used to generate the listing of VPN user accounts from the VPN administrator portal to determine whether all VPN user accounts were included in the system generated listing.</p>	No exceptions noted.

Control Objective O. Information Security

Controls provide reasonable assurance that logical access to programs, data, and computer resources is restricted to authorized and appropriate users, and such users are restricted to performing authorized and appropriate actions.

Control Activity		Testing performed	Results of Testing
O.7	Privileged-level access (e.g., security administrators) is authorized and appropriately restricted.	<p>Inquired of the Manager of Software Engineering responsible for ensuring that privileged-level access is authorized and appropriately restricted.</p> <p>Inspected network, UNIX, and IBWeb user listings generated from the system portals to determine whether privileged-level access is appropriately assigned and restricted to authorized individuals.</p> <p>Observed the imputation of data sets used to generate the network, UNIX, and IBWeb user listings from the system portals to determine whether all user accounts were included in the system generated listings.</p>	No exceptions noted.
O.8	Designated management personnel perform a review of the subservice organization's SOC reports when they become available to ensure that key controls identified at the subservice organizations are designed appropriately and operating effectively and that relevant complementary user entity controls within the report have sufficient coverage from a control standpoint at IBG.	<p>Inquired of the Compliance & Regulatory Liaison responsible for ensuring that designated management personnel perform a review of the subservice organization's SOC reports when they become available to ensure that key controls identified at the subservice organizations are designed appropriately and operating effectively and that relevant complementary user entity controls within the report have sufficient coverage from a control standpoint at IBG.</p> <p>Inspected the subservice organization's SOC reports obtained and retained by management, as well as the review memo to determine that management assessed any exceptions identified in the report that directly impacts their business processes and to certify that relevant complementary user entity controls within the report have sufficient coverage from a control standpoint at the Company.</p>	No exceptions noted.
O.9	On an annual basis, the IT group forwards the current key card access list of each secured location to the CIO, requesting notification if there are additions, deletions, and/or inappropriate individuals on the list. The CIO forwards the changes to the IT group to update.	<p>Inquired of the Manager of Network Services responsible for ensuring that on an annual basis, the IT group forwards the current key card access list of each secured location to the CIO, requesting notification if there are additions, deletions, and/or inappropriate individuals on the list.</p> <p>Inspected the key card access list and recertification documentation to determine whether the CIO reviewed and approved the list of users during the report period and that the updates to access identified during the review were applied.</p>	No exceptions noted.

Control Objective P. Change Management

Controls provide reasonable assurance that changes to application programs and related data management systems are authorized, tested, documented, approved, and implemented to result in the complete, accurate, and timely processing and reporting of transactions and balances.

Control Activity		Testing performed	Results of Testing
P:1	Controls exist to confirm that changes that have been moved into the production environment have been appropriately approved by management. If a change is made without approval or done outside of the System Change Management Process, the change appears on the Detective Control Match Report and a senior application manager is notified by email that there are unapproved changes requiring review. The Detective Control Match Report is cumulative with open items remaining on the report (and to applicable managers by email) until the release is performed through the IB Release process.	<p>Inquired of the Development and Operations Manager responsible for ensuring that controls exist to confirm that changes that have been moved into the production environment have been appropriately approved by management. If a change is made without approval or done outside of the System Change Management Process, the change appears on the Detective Control Match Report and a senior application manager is notified by email that there are unapproved changes requiring review.</p> <p>For a sample of changes performed outside of the system change management process taken from a list generated from IBWeb, inspected the Detective Control Match Report and corresponding email logs to determine that changes performed outside the system change management process were not resolved until a release was tested and approved through the standard IB release process.</p> <p>Observed the imputation of data sets used to generate the listing of changes from IBWeb to determine whether all changes were included in the system generated listings.</p>	No exceptions noted.
P:2	System changes to IBWeb are tracked through the IB Release system. The IB Release system tracks who requested the change, who approved the change, and the person who acknowledged the change, which is known as the IB Release process. The change management approver reviews the modification of code in an IBG test environment and approved changes are sent to the production queue. Larger and more critical changes are selected for additional quality assurance testing. Changes are outlined in an accompanying IB release report and are scrutinized by senior programmers and tested before being released.	<p>Inquired of the Development and Operations Manager responsible for ensuring that the development, testing, approval, and releasing of changes to IBWeb are tracked through the IB Release system.</p> <p>For a sample of IB Release changes taken from a list generated from IBWeb, inspected the corresponding IB Release report to determine whether the change was tested and approved by an individual not involved in the development or configuration of the change, the change was approved prior to being sent to the production queue and further reviewed by senior programmers prior to its release.</p> <p>Observed the imputation of data sets used to generate the listing of changes from IBWeb to determine whether all changes were included in the system generated listings.</p>	No exceptions noted.

Control Objective P. Change Management

Controls provide reasonable assurance that changes to application programs and related data management systems are authorized, tested, documented, approved, and implemented to result in the complete, accurate, and timely processing and reporting of transactions and balances.

Control Activity		Testing performed	Results of Testing
P:3	Privileged access to IB Release is appropriate. Only authorized personnel have the ability to approve and release changes.	<p>Inquired of the Development and Operations Manager responsible for ensuring that privileged access to IB Release is appropriate, with only authorized personnel having the ability to approve and release changes.</p> <p>Inspected the user permissions log for IB Release generated from IBWeb to determine whether the individuals who can approve and release changes are authorized.</p> <p>Observed the imputation of data sets used to generate the IB Release user listing from IBWeb to determine whether all user accounts were included in the system generated listing.</p>	No exceptions noted.