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**UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY**

**IN RE ROYAL DUTCH/SHELL
TRANSPORT SECURITIES LITIGATION**

Civil Action No. 04-374 (JAP)

EXPERT REPORT

of

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November 3, 2006

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TABLE OF CONTENTS

I. INTRODUCTION	1
II. QUALIFICATIONS AND COMPENSATION	3
III. MATERIALS REVIEWED	5
IV. ASSUMPTIONS	5
V. BACKGROUND	7
VI. OVERVIEW OF MY METHODOLOGY	8
A. EVENT STUDY METHODOLOGY	10
i. Estimating a Market Model for Royal Dutch New York Shares and Shell Transport ADRs	13
ii. Calculating the Predicted and Excess Returns	15
B. TRUE VALUE LINE AND ARTIFICIAL INFLATION	16
VII. BASES OF OPINIONS	18
A. MARKET EFFICIENCY	19
i. Cammer v. Bloom Criteria for Market Efficiency	20
ii. Additional Tests of Market Efficiency	31
B. MATERIALITY AND LOSS CAUSATION	36
i. Plaintiffs' Allegations of Misrepresentations and Omissions	36
ii. Disclosures Removing the Artificial Inflation Caused by the Misrepresentations and Omissions Concerning the Overstated Proved Reserves	37
iii. Summary	49
C. ARTIFICIAL INFLATION FOR EQUITY SECURITIES	51
D. ARTIFICIAL INFLATION (DEFLATION) FOR CALL (PUT) OPTIONS ..	54
i. Market Efficiency of Options	56
ii. Artificial Inflation/Deflation	62

I. INTRODUCTION AND SUMMARY OF OPINIONS

1. As described in greater detail in a later Section of this report, I am a tenured Professor of Economics and Finance at the University of Rochester's William E. Simon Graduate School of Business Administration. I have been retained by Plaintiffs' lead counsel to opine on issues relating to market efficiency, materiality, causation and per share damages. My opinions include the market effect of the alleged misrepresentations and omissions, the materiality of certain facts misrepresented or omitted, and the per share damages under Section 10(b) of the Securities Exchange Act of 1934 suffered by investors (the "Class" or "Class Members") who purchased the securities of N.V. Koninklijke Nederlandshe Petroleum Maatschappij (a/k/a the Royal Dutch Petroleum Company) ("Royal Dutch") and The Shell Transport and Trading Company ("Shell Transport") (collectively, "Royal Dutch/Shell" or the "Companies"), including the ordinary shares traded on the overseas markets and the New York Stock Exchange ("NYSE") and the American Depository Receipts ("ADRs") trading on the NYSE between April 8, 1999 and March 18, 2004 (the "Class Period"), as a result of the alleged misrepresentations and omissions by Royal Dutch and Shell Transport, et al. (collectively the "Defendants").^{1,2}

¹ Royal Dutch shares primarily traded on the NYSE and Euronext/Amsterdam Exchanges in addition to other foreign exchanges. Shell Transport ADRs traded on the NYSE and Shell Transport shares primarily traded on the London Stock Exchange ("LSE") in addition to other foreign exchanges. In this report, I refer to the Royal Dutch shares traded on the NYSE and the Royal Dutch shares traded on the Euronext/Amsterdam Exchange as "Royal Dutch equity securities" and the Shell Transport ADRs traded on the NYSE and Shell Transport shares traded on the LSE as "Shell Transport equity securities" (collectively "Royal Dutch and Shell Transport equity securities").

² The Class also includes purchasers of call options on Royal Dutch and Shell Transport equity securities and sellers of put options on Royal Dutch and Shell Transport equity securities.

2. I offer several opinions in this report, which are summarized in subparagraphs (a) through (e) below. Detailed explanations and the bases for these opinions are provided in the sections that follow.

- a) During the Class Period, Royal Dutch and Shell Transport equity securities traded in what economists refer to as an efficient market with regard to publicly disclosed information;
- b) Information disclosed to the market on January 9, 2004 and March 18, 2004, taken together, removed the artificial inflation caused by the alleged misstatements and omissions;
- c) The excess (net of market and industry) stock price declines from the disclosures listed in (b) above were economically material and caused investor losses;
- d) Assuming Plaintiffs prevail on their claims, I have determined the amount of artificial inflation present in Royal Dutch and Shell Transport equity securities prices on each day of the Class Period from which the per share damages suffered by Class Members who bought those securities can be computed (see Exhibits 22 - 25), under Section 10(b) of the Securities Exchange Act of 1934 (as limited by the Private Securities Litigation Reform Act of 1995); and
- e) I have also determined that the call and put options on the Royal Dutch and Shell Transport equity securities traded in an efficient market and calculated the amount of artificial inflation (deflation) present in Royal Dutch and Shell Transport calls (puts) on each day of the Class Period from which the per option damages suffered by Class Members who bought those options can be computed (see Exhibits 27 and 28).

3. I understand that discovery in this case is ongoing and has not yet been completed. Therefore, I reserve the right to amend this report in light of the ongoing discovery process and future trial proceedings.

II. QUALIFICATIONS AND COMPENSATION

4. I am currently a tenured Professor of Economics and Finance at the University of Rochester's William E. Simon Graduate School of Business Administration, where I have been a member of the faculty since 1988. I hold a Ph.D. in Business Economics from the University of Chicago (1978), with major concentrations in Industrial Organization and Finance, as well as an MBA (1976) from the University of Chicago.

5. From 1978 to 1981, I was an Assistant Professor of Economics at the Graduate School of Management at the University of Rochester. From 1981 to 1983, I was a Post-Doctoral Research Fellow at the University of Chicago's Center for the Study of the Economy and the State. Thereafter, from 1983 to 1984, I was a Senior Economist with Lexecon, Inc., a Chicago economics consulting firm specializing in antitrust and securities litigation. I served as an expert in mergers and acquisitions on the 1983 United States Securities and Exchange Commission (the "SEC") Advisory Committee on Tender Offer Policy. From 1984 through 1987, I was the Chief Economist for the SEC in Washington, D.C. I also served as an Adjunct Professor at the Georgetown University Law School in Washington, D.C. during 1985 and 1986, where I co-taught a course on securities regulation. From 1987 to 1988, I was the Senior Vice President and Director of Research at the Alcar Group, Inc., a Chicago-based management consulting and software firm specializing in financial valuations of businesses and securities.

6. Since joining the Simon School faculty at the University of Rochester, I have served (from 1988 to 1990) as director of the school's Managerial Economics Research Center. I also served as director of the Bradley Policy Research Center at the Simon School from 1990 to 1994. In addition, I have taught a case course titled Cases in Finance to second-year MBA

students that covers, among other subjects, the operation of financial markets and the market for corporate control, the economics of mergers and acquisitions, valuation analysis for businesses and securities, the response of stock prices to public information, and financial regulation of securities markets. I also teach a price theory course called Managerial Economics that includes applications of intra-company pricing of transfers of products and services. I have received six Superior Teaching Awards, and I was the School's AT&T Foundation Resident Management Fellow in 1987.

7. I have authored or co-authored more than two dozen articles and studies in scholarly journals generally on the topics of mergers and acquisitions, the regulation of financial markets, and the response of stock prices to the release of information, among other things. I have also published widely in other forums outside academic journals. My curriculum vitae, with a list of publications and of recent cases in which I have testified as an expert at deposition or trial, is attached as Exhibit 1.

8. My compensation, which is not contingent upon the outcome of this case, is based on the number of hours worked on this assignment, as well as out-of-pocket expenses. My hourly rate is \$500. To assist me in this assignment, I have worked with Forensic Economics, Inc., whose employees acted under my supervision and at my direction for this assignment. The hourly rates of the employees of Forensic Economics who worked on this assignment range from \$125 to \$350.

III. MATERIALS REVIEWED

9. In the course of my assignment in this action, I have reviewed numerous case documents, including the Plaintiffs' Second Consolidated Amended Class Action Complaint dated September 19, 2005 (the "Complaint"), SEC filings, analyst reports, market prices and volume, news stories, institutional holdings of Royal Dutch and Shell Transport equity securities, and volume, open interest, bid, ask and closing prices for Royal Dutch and Shell Transport call and put options. Attached as Exhibit 2 is a comprehensive list of materials reviewed in connection with this report. I have attempted to cite in the text of the report some of the specific documents and information on which I have relied in reaching my opinions.

IV. ASSUMPTIONS

10. Generally, my opinions are based on the assumption that Plaintiffs will prevail at trial on the allegations of wrongdoing contained in the Complaint or revealed during discovery. I assume, as alleged by Plaintiffs, that the Defendants had a duty to accurately report, or cause Royal Dutch and Shell Transport to report, the true amount of their proved oil and gas reserves.

11. The Complaint alleges that Defendants overstated the Companies' reported proved oil and gas reserves, that those overstatements violated Rule 4-10 of Regulation S-X, 17 C.F.R. § 210.4-10, as well as accounting rules and guidelines relating to proved oil and gas reserves, and that those overstatements, once revealed, damaged purchasers of Royal Dutch and Shell Transport equity securities and call options and sellers of Royal Dutch and Shell Transport put options.

12. The alleged false and misleading statements by the Defendants relate specifically to the following:

- a) the amount of Royal Dutch/Shell's proved reserves and reserves replacement ratio, and the Companies' methodology for determining proved reserves;³
- b) Royal Dutch/Shell's financial metrics, including year-end cash flow provided by operating companies/activities; exploration costs; depreciation, depletion and amortization; and net income;⁴
- c) Royal Dutch/Shell's internal controls and corporate governance;⁵
- d) the Outside Auditors' Report of Independent Accountants/Report of the Auditors;⁶ and
- e) the growth of Royal Dutch/Shell's rate of hydrocarbon production in Nigeria.⁷

13. In addition, I have assumed that Plaintiffs will prove at trial that the reduction in expected 2003 proved reserves additions was caused by the same course of misconduct that caused the proved reserves as of December 31, 2002 to be reduced by 3.9 billion barrels, and that Defendants had a duty to disclose the true expected 2003 reserve addition.

³ See Complaint, ¶¶310-16, 326, 331-32, 334, 336-39, 349-53, 361-66, 368-71, 381-85, 397-98, 401-01, 413-16, 426-27, 429-31, 434-36, 440-44, 454-60.

⁴ See Complaint, ¶¶317, 326, 333, 340, 354, 367, 372, 386, 399, 405, 417, 428, 445, 461, 465-68.

⁵ See Complaint, ¶¶318-19, 326, 341-44, 355-56, 373-76, 387-88, 395-96, 406-08, 418-19, 424-25, 432-33, 437-38, 446-49, 462-63.

⁶ See Complaint, ¶¶320-23, 326, 345-48, 357-60, 377-80, 389-92, 409-12, 420-23, 450-53, 469-72.

⁷ See Complaint, ¶¶393-94.

V. BACKGROUND

14. According to the Form 20-F filed by Royal Dutch and Shell Transport with the SEC for fiscal year 1998, Royal Dutch was incorporated on June 16, 1890 under the laws of Netherlands and Shell Transport was incorporated on October 18, 1897 under the laws of England. In 1907, Royal Dutch and Shell Transport entered into an alliance, as a result of which the two companies agreed to merge their interests in the companies known collectively as the Royal Dutch/Shell Group of Companies on a 60:40 basis, while remaining separate and distinct entities. Under this structure, Royal Dutch and Shell Transport did not engage in operational activities and derived the whole of their respective incomes, except interest income on cash balances or short-term investments, from their respective interests in the Royal Dutch/Shell Group of Companies.

15. As of December 31, 1998, Royal Dutch had 2,144,296,352 ordinary shares of 1.25 guilders (N. Fl. 1.25) each outstanding. The principal trading markets for the ordinary shares of Royal Dutch were Amsterdam and New York. Royal Dutch shares were also listed on stock exchanges in Austria, Belgium, France, Germany, Luxemburg and Switzerland.⁸ As of March 24, 1999, there were 814,233,616 shares of New York Registry ("Royal Dutch New York Shares") outstanding. For the year 1997, Royal Dutch distributed N.fl. 3.10 per share, or \$1.55 per share, in dividends. Dividends paid by Royal Dutch were subject to the taxation laws of The Netherlands.

⁸ For the purposes of this expert report relating to Royal Dutch, I focus on the New York and Euronext/Amsterdam markets. I refer to the Royal Dutch shares traded on the Euronext/Amsterdam Exchange as "Royal Dutch Amsterdam Shares." However, the same methodology can be adopted to quantify the amount of artificial inflation in Royal Dutch stock prices on the other exchanges.

16. As of December 31, 1998, Shell Transport had 9,943,509,726 ordinary shares of nominal amount of 25p each outstanding. The principal trading market for Shell Transport ordinary shares was the London Stock Exchange. Shell Transport ordinary shares were also listed and traded on stock exchanges in Belgium, France and Germany.⁹ American Depositary Receipts ("ADRs") were listed and traded on the NYSE. Each ADR represented six 25p ordinary shares. As of March 24, 1999, there were 54,463,800 ADRs outstanding. For the year 1997, Shell Transport distributed 13.1p per share, or \$1.42 per ADR, in dividends. Dividends paid by Shell Transport were subject to the taxation laws of the United Kingdom.

VI. OVERVIEW OF MY METHODOLOGY

17. Section 10(b) of the Securities Exchange Act of 1934 requires calculation of recoverable damages based on actual damages. In addition, the 90-day "look back" provision of the Private Securities Litigation Reform Act of 1995 ("PSLRA") provides a limit on the maximum amount of recoverable damages.¹⁰

⁹ For the purposes of this expert report relating to Shell Transport, I focus on the ADRs and the ordinary shares traded on the London Stock Exchange ("Shell Transport London Shares"). However, the same methodology can be adopted to quantify the amount of artificial inflation in Shell Transport stock prices on the other exchanges.

¹⁰ Section 21D(e)(1) of the PSLRA (15 U.S.C. §78u-4(e)(1)) provides that the maximum amount of recoverable damages for securities purchased during the class period and retained through the 90-day period following the day on which the alleged misstatements or omissions were corrected ("90-day lookback period") are limited to the difference between the purchase price paid and the mean trading price of the security for the 90-day lookback period. Section 21D(e)(2) of the PSLRA (15 U.S.C. §78u-4(e)(2)) provides that if the security is sold during the 90-day lookback period, the maximum amount of recoverable damages are limited to the difference between the purchase price paid and the mean trading price for the security during the period beginning on the day on which the alleged misstatements and omissions were corrected and ending on the date of sale.

18. It is generally accepted that damages in Section 10(b) securities cases (involving fraud in connection with a purchase) are defined as the difference between the purchase price and the true value of the security at the date of purchase less the difference between the sale price and the true value of the security at the date of sale. The “true value” of the security is the value absent the alleged misrepresentations or omissions. The difference between the purchase/sale price and true value is called “artificial inflation.” Thus, for shares purchased during the Class Period and subsequently sold during the Class Period after a corrective disclosure, damages per share can be computed as the artificial inflation at purchase minus the artificial inflation at sale. However, for shares sold after the Class Period, because the fraud has generally been fully disclosed, no artificial inflation usually remains in the security’s price. Therefore, for shares purchased during the Class Period and held through the end of the Class Period (*i.e.*, the time of complete disclosure to the market of the misstatements or omissions), damages per share equal artificial inflation at the time of purchase (limited by the effect of the PSLRA’s look back provision) with no reduction for artificial inflation at sale. To estimate damages, therefore, it is necessary to estimate the true value of the security.

19. In order to reasonably estimate damages suffered by the Class, I performed several analyses to estimate (i) the amount of artificial inflation caused by the alleged fraud and (ii) when and in what magnitude that artificial inflation entered the market. These analyses include, but are not limited to, the following:

- a) **Event Study.** The first step in calculating damages in a securities fraud case is to perform what is known in financial economics as an event study. Event study methodology, which is described in more detail below, is a widely accepted tool to measure the effect on market prices from new information relevant to a company’s equity valuation. When used to calculate damages in a securities fraud case, an event study is generally used to assess materiality, loss causation,

and as the basis for the amount of artificial inflation present in the market price of the common stock during the class period.¹¹

- b) **Constructing the True Value Line** - requires a determination about when and in what amounts the artificial inflation entered the market price of the issuer's common stock.

A. EVENT STUDY METHODOLOGY

20. As a general proposition, modern finance theory holds that the market price of a stock reflects the expected discounted value of future cash flows to equity holders. Thus, new information that causes the market to significantly alter its expectation of future cash flows will cause a prompt repricing of the stock to reflect the new expectations.¹²

21. One important source of information that the market uses to formulate expectations of future cash flows are company disclosures concerning the financial condition of the company. Disclosures of this type that are significantly different from what was expected (surprises) typically cause a revision of investors' earnings and cash-flow forecasts, resulting in a significant change in the stock price.

22. Since the publication in 1969 of a classic paper by Fama, Fisher, Jensen, and Roll,¹³ financial economists have used event study methodology to measure the effect on market prices of new information relevant to a company's equity valuation. New information may

¹¹ See M. Mitchell, J. Netter, 1994, "The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission," *The Business Lawyer* 49 (February), 545-590; and D. Tabak and F. Dunbar, "Materiality and Magnitude: Event Studies in the Courtroom," in *Litigation Services Handbook: The Role of the Financial Expert, Third Edition*, ed. by R. Weil, M. Wagner and P. Frank, Wiley, USA, 2001, 19.1.

¹² See E. Fama, 1991, "Efficient Capital Markets: II," *Journal of Finance* 46 (December), 1575-1617.

¹³ See E. Fama, L. Fisher, M. Jensen, R. Roll, 1969, "The Adjustment of Stock Prices to New Information," *International Economic Review* 10 (February), 1-21.

include earnings reports, dividend changes, stock-splits, company press releases on current or projected revenues, regulatory rulings, acquisition bids, asset sales, tax legislation, or any other information that is relevant to investors' assessments of future cash flows. Event study methodology also has been widely used to assess the effect on market prices from disclosures of false and misleading information in fraud-on-the-market cases.¹⁴

23. An event study is an empirical technique that measures the effect of new information on the market prices of a company's publicly traded securities. This is done by comparing the day-to-day percentage change in the market price of a company's common stock (known as a "return") to the return predicted by a market model that uses a market index, such as the S&P 500 Index or the Nasdaq Composite Index, and possibly an industry index.¹⁵ The market model describes the normal relation between the return on the company's common stock and the return on the market and industry indexes. When significant new information about the company (e.g., corrective disclosures, earnings reports, dividend changes, stock splits, regulatory rulings, acquisition bids, asset sales, or tax legislation) is disclosed to the market, the market model is used to determine the component of the stock return that would be expected based on the return of the overall market and industry. The remaining component of the stock return (that which cannot be explained by the return on the market and industry) is attributed to the new company-specific information or to chance. If the disclosure of the new information is

¹⁴ See M. Mitchell, J. Netter, 1994, "The Role of Financial Economics in Securities Fraud Cases: Applications at the Securities and Exchange Commission," *The Business Lawyer* 49 (February), 545-590; and D. Tabak and F. Dunbar, "Materiality and Magnitude: Event Studies in the Courtroom," in *Litigation Services Handbook: The Role of the Financial Expert, Third Edition*, ed. by R. Weil, M. Wagner and P. Frank, Wiley, USA, 2001, 19.1.

¹⁵ See J. Campbell, A. Lo, & A. Craig MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press (1997), p. 156.

accompanied by a stock return that is outside of the stock's normal volatility range (as measured by the market model), then the return is said to be "statistically significant."¹⁶

24. The stock price change caused by a corrective disclosure generally is the best estimate of the change in the amount of artificial inflation on the date of the disclosure because the corrective disclosure removes artificial inflation from the market price of the stock. Event studies also assess the probability that a stock price movement was due to news disclosed about a particular event, and not due to chance. Thus, the event study can objectively quantify the market price movements associated with the disclosure of new information to assess the materiality of that information to investors.

25. The event study methodology used to calculate damages in securities fraud cases relies on two well-accepted principles. First, the price of an actively traded security reflects all publicly available information and responds quickly to new information. Second, the price of an efficiently traded stock is equal to the present discounted value of the expected future stream of free cash flows.¹⁷ Event studies are most useful in determining the effects of new information on security prices when: (i) there is a well-defined public disclosure; (ii) the time that the news item reaches the market is known; (iii) there is no reason to believe that the market anticipated the news item; and (iv) it is possible to isolate the effect of the news item from market, industry, and other issuer-specific factors simultaneously affecting the issuer's security price.¹⁸

¹⁶ The determination of a statistically significant return must account for the individual stock's normal volatility. Accordingly, event studies start by computing "excess returns" (the percentage change in the company's stock price including dividends, net of market-wide and industry-wide influences) and the volatility of these excess returns.

¹⁷ See R. Brealey, S. Myers, 1996, *Principles of Corporate Finance*, 5th Edition, McGraw Hill, 71 & Ch. 4.

¹⁸ D. Tabak and F. Dunbar, "Materiality and Magnitude: Event Studies in the Courtroom," in *Litigation Services Handbook: The Role of the Financial Expert*, Third Edition,

26. The event study methodology involves the following well-defined steps:¹⁹
- a) A market model is estimated to permit the removal of market and possibly industry-wide effects from the day-to-day security returns;
 - b) The market model is used to calculate predicted returns for the issuer's security assuming that there was no fraud and, therefore, no corrective disclosures;
 - c) The predicted returns are then subtracted from the issuer's actual returns to calculate excess returns, which are the price movements in the issuer's security net of market and possibly industry-wide effects; and
 - d) On the day or days on which significant new information is disclosed to the market, the excess returns are used to quantify the effect of those disclosures on the market price of the security.

These steps are discussed in detail in the paragraphs below.

i. Estimating a Market Model for Royal Dutch New York Shares and Shell Transport ADRs

27. In order to determine whether the changes in the market price of Royal Dutch New York Shares and Shell Transport ADRs were caused by a specific event or announcement, the actual returns for the issuer's common stock are compared to the returns predicted by a market model that controls for market-wide and industry-wide effects on the stock return. Thus, the first step in the event study methodology is to estimate an appropriate market model. This is done by first selecting a proxy for the market, customarily the S&P 500 Index, the NYSE Composite Index, the Nasdaq Composite Index, or another broad-based market index, as well as an index to proxy for industry-specific changes that might affect the company's stock return over-and-above general market-wide factors. Then, the company's return is regressed against

ed. by R. Weil, M. Wagner and P. Frank, Wiley, USA, 2001, 19.2.

¹⁹ D. Tabak and F. Dunbar, "Materiality and Magnitude: Event Studies in the Courtroom," in *Litigation Services Handbook: The Role of the Financial Expert, Third Edition*, ed. by R. Weil, M. Wagner and P. Frank, Wiley, USA, 2001, 19.2-3.

the market and net-of-market industry variables to estimate the historical relation between the “independent” index variables and the “dependent” company returns.²⁰ In essence, the indexes “explain” or account for some portion of the day-to-day movements in the company’s gross return, so that the “unexplained” portion of the company’s stock return can be attributed to “firm-specific” factors besides any co-movement in the market-wide and net-of-market industry indexes.

28. The regression analysis produces a constant term, also called an intercept term, and one or more slope coefficients, called “betas.” The slope coefficients or betas quantify the sensitivity of a stock’s return to the return to the market index and also the return to any industry indexes, if used. A stock with a market beta of 1.0 is expected to increase (decrease) by one percent for each one percent increase (decrease) in the market index. Similarly, a stock with a market beta of 2.0 is expected to increase (decrease) by two percent for each one percent increase (decrease) in the market index. Likewise, a stock with an industry beta of 1.0 is expected to increase (decrease) by one percent for each one percent increase (decrease) in the value of the industry index (net of the market return).

29. I selected the S&P 500 Index as the proxy for the market, and an industry index based on companies in the S&P 500 Oil (Domestic Integrated) and the S&P 500 Oil (International Integrated) Indexes.²¹ It is generally preferred to estimate the market model

²⁰ The return on the industry index is generally measured “net of market” to minimize the effects of a statistical phenomenon called multicollinearity.

²¹ Standard & Poor’s decided to exclude foreign companies from their US indexes effective July 2002. Until that time, Royal Dutch was part of the S&P 500 Index as well as the S&P 500 Oil (International Integrated) Index. I calculated an equally-weighted index based on a portfolio of companies included in the S&P 500 Oil (Domestic Integrated) Index and the S&P 500 Oil (International Integrated) Index between 1997 and 2001, excluding Royal Dutch. Those firms, as listed in the S&P 500 Index between 1997 and 2001 followed by their respective

regression over a period when the stock prices are not affected by events that are to be evaluated. In the context of securities litigation, it is customary to estimate the market model regression based on stock prices before the beginning of the Class Period. I note that Royal Dutch and Shell Transport ultimately restated their reserves as far back as 1996, which would have been disclosed in their annual report sometime in 1997.²² Therefore, I selected 1995 through 1996 as the appropriate period to estimate the market model regression.

30. Using daily return data from 1995 through 1996, the market model for Royal Dutch New York Shares yielded an intercept of 0.0003, a market beta of 0.80 and an industry (net of market) beta of 0.57, and the market model for Shell Transport ADRs yielded an intercept of 0.0004, a market beta of 0.70 and industry (net of market) beta of 0.54 (see Exhibit 8).

ii. Calculating the Predicted and Excess Returns

31. After estimating the market model, the next step is to use it to calculate the predicted daily returns for Royal Dutch New York Shares and Shell Transport ADRs. The predicted returns are equal to the intercept term from the regression plus the market beta multiplied by the return on the market index (here the S&P 500 Total Return Index) plus the industry beta multiplied by the return on the industry index net of the market return. I then

current Tradeline ticker are: Amerada Hess (HES); Atlantic Richfield (C:04882510); Conoco Inc. (COC A); Conoco Inc. (B shares) (C:20825150); Occidental Petroleum (OXY); Pennzoil Co. (C:70931Q10); Phillips Petroleum (COP); USX-Marathon Group (MRO); Unocal Corp. (UCL); Amoco (C:03190510); Chevron Corp. (CVX); Chevron Texaco Corp. (CVX); Exxon Corp. (XOM); Exxon Mobil Corp. (XOM); Mobil Corp. (MOB); Texaco Inc. (C:88169410); Devon Energy Corp. (DVN); and BP plc. (BP). The stock prices for these firms were obtained from SunGard PowerData (Tradeline) on a split and cash adjusted basis.

²² "Shell Transport. SHEL 4th Qtr & Final Results, etc," RNS, February 13, 1997, 5:00 AM, "THE SHELL TRANSPORT AND TRADING COMPANY PLC - ANNUAL REPORT 1996," RNS, April 11, 1997, 2:29 AM, "ROYAL DUTCH PETROLEUM COMPANY NV - ANNUAL REPORT 1996," RNS, April 21, 1997, 10:43 AM.

calculated excess returns by subtracting the predicted returns from Royal Dutch New York Shares and Shell Transport ADR actual returns. As described in more detail below, I used the excess returns to quantify the impact of the corrective disclosures on the value of Royal Dutch New York Shares and Shell Transport ADRs.

32. The actual returns generally deviate from the predicted returns even when no observable disclosure or event has occurred. Accordingly, the event study methodology requires a determination of whether an excess return is likely attributable to chance. This is done by testing the excess return for statistical significance. The statistical significance of the daily excess returns is indicated by the "t-statistic." A t-statistic greater than 1.96 in absolute value (either positive or negative) means that the excess return is significant at the 95% confidence level; a t-statistic greater than 2.58 in absolute value means that the excess return is significant at the 99% confidence level. As is common in financial economics research, I considered excess returns with a t-statistic greater than 1.96 in absolute value as statistically significant.

B. TRUE VALUE LINE AND ARTIFICIAL INFLATION

33. I used an event study approach to estimate the true value line for Royal Dutch New York Shares and Shell Transport ADRs. Under this approach, as described by Cornell and Morgan, it is assumed that: "...the price and the value of the security move in tandem except on days when fraud-related information is disclosed."²³ Cornell and Morgan further describe how the event study method proceeds.²⁴

- (i) Collect the data and estimate the market model;

²³ B. Cornell and R. Morgan, "Using Finance Theory to Measure Damages in Fraud on the Market Cases," *UCLA Law Review* 37, 883-923 (June 1990), p. 899.

²⁴ *Ibid.*

- (ii) Construct a time series of daily returns. If no fraud-related information is disclosed, set the return that day to the actual return on the security. If fraud-related information is disclosed, or there is evidence that such information is leaking into the market, set the return for that day equal to the return on the security predicted by the market model; and
- (iii) Use the series of returns calculated above ("constructed returns") to calculate the value line backwards in time according to the formula:

$$\text{Value}(t-1) = \text{Value}(t) / \{ 1 + \text{Constructed Return}(t) \}.$$

34. This method yields a true value line that, between days where information relating to the alleged fraud are released, is a constant percentage of the actual stock price. This method has also been called a "Constant Percentage" method, compared to the "Constant Dollar" method that is also employed to estimate a true value line.²⁵ Under a Constant Dollar method, a dollar measure of the fraud is applied to all days. The choice of methodology is dependent on case-specific factors relating to the alleged fraud. If the fraud is a specific dollar amount that would affect the company's valuation the same way at any time, then the Constant Dollar method is appropriate. If the fraud would affect the company differently at different times due to market, industry or other (non-fraud) company-specific factors, then the Constant Percentage method is more appropriate economically. Because the alleged misrepresentations and omissions regarding Royal Dutch/Shell related to proved reserves, the value of which would fluctuate with oil prices, expected margins, etc., and which would affect the growth prospects of the Companies' earnings and revenues, the Constant Percentage is the economically appropriate methodology to use.

35. Under the Constant Percentage method, the dollar amount of artificial inflation will generally change on a daily basis. However, it is my understanding that investors can only

²⁵ For example, see D. Tabak and C. Okongwu, "Inflation Methodologies in Securities Fraud Cases: Theory and Practice," NERA working paper (July 2002).

recover damages for shares purchased that were subsequently held over a corrective disclosure. Therefore, any Royal Dutch New York Shares and Shell Transport ADRs purchased during the Class Period and sold before the first corrective disclosure on January 9, 2004 are not damaged.

36. I also limited the artificial inflation that results from the Constant Percentage method by the per share dollar drop associated with the corrective disclosures. This method of determining damages per share has been described as the minimum of artificial inflation at purchase (by the Constant Percentage method) and the dollar loss caused by the corrective disclosures.²⁶ The limitation is also designed to satisfy the U.S. Supreme Court Decision in *Dura Pharmaceuticals v. Broudo*, 544 U.S. 336 (2005), which some have argued caps the amount of per share damages to the dollar drop in the stock that was caused by the revelation of fraud.

VII. BASES OF OPINIONS

37. I identify and analyze, using event study methodology, two disclosures that, in my view, removed the artificial inflation caused by the alleged misrepresentations and omissions by the Defendants about Royal Dutch/Shell's oil and gas reserves. But first, I assessed whether Royal Dutch and Shell Transport equity securities traded in an efficient market in order to meet the legal requirement for a fraud-on-the-market case. Therefore, I first provide the bases for my opinion that Royal Dutch and Shell Transport equity securities traded in an efficient market. I next provide the bases for my opinions on materiality and loss causation, and then I calculate daily artificial inflation per share of common stock.

²⁶ See D. Tabak and C. Okongwu, "Inflation Methodology in Securities Fraud Cases: Theory and Practice," NERA working paper, July 2002 and D. Tabak, "Loss Causation and Damages in Shareholder Class Actions: When It Takes Two Steps to Tango," NERA working paper, May 2004.

38. I also provide the bases of my opinion that the call and put options on Royal Dutch and Shell Transport equity securities traded in an efficient market and calculate the artificial inflation/(deflation) present in the prices of call/(put) options on Royal Dutch and Shell Transport equity securities.

39. I discuss the bases for these conclusions below.

A. MARKET EFFICIENCY

40. The efficient market hypothesis has historically been divided into three categories, each dealing with a different type of information. Weak form tests of the efficient market hypothesis are tests of whether information contained in historic prices is fully reflected in current prices. Semi-strong form tests of the efficient market hypothesis are tests of whether publicly available information is fully reflected in current prices. Finally, strong form tests of the efficient market hypothesis are tests of whether all information, whether public or private, is fully reflected in security prices.²⁷ In fraud-on-the market litigation, the Courts have generally adopted the semi-strong form of the efficient market hypothesis. For example in *Basic, Inc. v. Levinson*, 485 U.S. 224 (1988), the U.S. Supreme Court stated “[r]ecent empirical studies have tended to confirm Congress’ premise that the market price of shares traded on well-developed markets reflects all publicly available information, and, hence, any material misrepresentations.”

41. The Courts generally accept as evidence of an efficient market the results of a number of statistical findings or criteria for market efficiency. See, for example, *Cammer v. Bloom*, 711 F. Supp 1264 (D.N.J. 1989); and *Binder v. Gillespie*, 184 F.3d 1059 (9th Cir 1999).

²⁷ See E. Elton, M. Gruber, S. Brown and W. Goetzmann, *Modern Portfolio Theory and Investment Analysis, Sixth Edition*, John Wiley & Sons, Inc., 2003, p. 402.

42. I examined the widely-accepted criteria for market efficiency in regards to Royal Dutch and Shell Transport equity securities during the Class Period. Based on these analyses, the market for Royal Dutch and Shell Transport equity securities was efficient.

i. Cammer v. Bloom Criteria for Market Efficiency

43. In *Cammer v. Bloom*, 711 F. Supp 1264 (D.N.J. 1989), five criteria were listed that would give rise to a strong presumption that a security traded in an efficient market: (i) average weekly share turnover of over 1%; (ii) coverage of the company by security analysts; (iii) the presence of market-makers or arbitrageurs; (iv) the eligibility of the company to file Form S-3 with the SEC; and (v) evidence of the stock price reacting to material information.

a) Weekly Trading Volume

44. The first significant indicia of an efficient market in *Cammer v. Bloom* is when the average trading volume per week exceeds one percent of shares outstanding. The *Cammer* opinion states that: "average weekly trading of two percent or more of the outstanding shares would justify a strong presumption that the market for the security is an efficient one; one percent would justify a substantial presumption."²⁸

45. The reported trading volume during the Class Period for Royal Dutch Petroleum New York Shares was 3.59 billion shares. The 3.59 billion total reported volume represents five times Royal Dutch's average New York Shares outstanding. The average weekly trading volume as a percentage of Royal Dutch's New York Shares outstanding was more than 2% over the Class Period.²⁹ The high trading volume for the Royal Dutch New York Shares supports the

²⁸ *Cammer v. Bloom*, 711 F. Supp. 1264 (D.N.J. 1989), page 1286.

²⁹ I calculate weekly volume as the sum of the daily volume during the week beginning on Monday and ending on Friday. The number of Royal Dutch shares registered to be traded on the NYSE were obtained from the annual Form 20-F filed with the SEC. Between any two

conclusion that the Royal Dutch New York Shares traded in an efficient market during the Class Period.

46. The reported trading volume during the Class Period for Royal Dutch Petroleum shares on the Euronext/Amsterdam Exchange was 10.45 billion shares. The 10.45 billion total reported volume represents approximately five times Royal Dutch's average shares outstanding available to trade on the Euronext/Amsterdam Exchange. The average weekly trading volume as a percentage of Royal Dutch's shares outstanding available to trade on the Euronext/Amsterdam Exchange was more than 2.9% over the Class Period.³⁰ The high trading volume for the Royal Dutch shares on the Euronext/Amsterdam Exchange also supports the conclusion that the Royal

reporting dates, the ratio of weekly volume to Royal Dutch New York Shares is calculated by dividing the weekly volume by the average of the Royal Dutch shares registered to be traded on the NYSE as reported in the Form 20-F filed preceding and following each week ("Average Royal Dutch New York Shares Outstanding"). The partial weeks at the beginning and end of the Class Period (April 8-9, 1999 and March 15-18, 2004) are excluded from the calculations.

³⁰ I calculate weekly volume as the sum of the daily volume during the week beginning on Monday and ending on Friday. The number of Royal Dutch shares outstanding were obtained from SEC filings and a spreadsheet of share repurchases from Shell Group's website. The number of Royal Dutch shares outstanding available to trade on the Euronext/Amsterdam Exchange were calculated by subtracting the average Royal Dutch New York Shares Outstanding from the total shares outstanding. The partial weeks at the beginning and end of the Class Period (April 8-9, 1999 and March 15-18, 2004) and the time period with volume data for less than three trading days in a week (July 24, 2000 through August 4, 2000) are excluded from the calculations. I obtained price and volume data for the trading of Royal Dutch shares on the Euronext/Amsterdam Exchange from various sources including Bloomberg, Tradeline and FT Interactive Data. I report the statistics for average weekly volume based on the data from Tradeline. I selected Tradeline because it is a well-known and frequently-used data source. The prices from Tradeline were virtually identical to the prices from Bloomberg. Although, there were differences in the volume data between Tradeline and Bloomberg, the average weekly trading volume as a percentage of Royal Dutch's shares outstanding available to trade on the Euronext/Amsterdam Exchange based on Bloomberg volume data is 2.29%, which is also high and supports the conclusion that the Royal Dutch shares traded in an efficient market on the Euronext/Amsterdam Exchange during the Class Period.

Dutch shares traded in an efficient market on the Euronext/Amsterdam Exchange during the Class Period.

47. The reported trading volume during the Class Period for Shell Transport ADRs was 469.6 million ADRs. The 469.6 million total reported volume represents more than eight times Shell Transport's average ADRs. The average weekly trading volume as a percentage of Shell Transport ADRs outstanding was more than 3% over the Class Period.³¹ The high trading volume for the Shell Transport ADRs supports the conclusion that the Shell Transport ADRs traded in an efficient market during the Class Period.

48. The reported trading volume during the Class Period for Shell Transport shares on the LSE was 44.2 billion shares. The 44.2 billion total reported share volume represents more than four times Shell Transport's average shares outstanding available to trade on the LSE. The average weekly trading volume as a percentage of Shell Transport shares outstanding available to trade on the LSE was approximately 1.8% over the Class Period.³² The high trading volume

³¹ I calculate weekly volume as the sum of the daily volume during the week beginning on Monday and ending on Friday. The number of Shell Transport ADRs outstanding were obtained from the annual Form 20-F filed with the SEC. Between any two reporting dates, the ratio of weekly volume to Shell Transport ADRs outstanding is calculated by dividing the weekly volume by the average of the Shell Transport ADRs outstanding as reported in the Form 20-F filed preceding and following each week ("Average Shell Transport ADRs outstanding"). The partial weeks at the beginning and end of the Class Period (April 8-9, 1999 and March 15-18, 2004) are excluded from the calculations.

³² I calculate weekly volume as the sum of the daily volume during the week beginning on Monday and ending on Friday. The number of Shell Transport shares outstanding were obtained from SEC filings and a spreadsheet of share repurchases from Shell Group's website. The number of Shell Transport shares outstanding available to trade on the LSE were calculated by subtracting six times the average Shell Transport ADRs Outstanding (as each Shell Transport ADR represents six Shell Transport shares) from the total shares outstanding. The partial weeks at the beginning and end of the Class Period (April 8-9, 1999 and March 15-18, 2004) are excluded from the calculations. I obtained price and volume data for the trading of Shell Transport shares on the LSE from various sources including Bloomberg, Tradeline and FT Interactive Data. I report the statistics for average weekly volume based on the data from

for the Shell Transport shares supports the conclusion that the Shell Transport shares traded in an efficient market on the LSE during the Class Period.

b) Analyst Coverage

49. The second indicia of an efficient market in *Cammer v. Bloom* is how intensive is coverage of the Company by security analysts. In an article published in 2000, Thomas and Cotter state that "Analyst coverage is the most widely-accepted method of measuring when securities markets are efficient at processing information."³³ Thomas and Cotter use a demarcation of three sell-side analysts following the firm, and use First Call as a source for the number of sell-side analysts. Several securities analysts employed by major banks and brokerage firms, including ABN-AMRO, Banc of America Securities, Bear Stearns, BNP Paribas Equities, CDC IXIS Securities, CIBC World Markets, Citigroup Smith Barney, Commerzbank, Credit Lyonnais Securities, Credit Suisse First Boston, Delta Lloyd Securities, Deutsche Bank Research, ING Financial Markets, Investec Securities, JP Morgan, Kempen & Co., Morgan Stanley, Natexis Bleichroeder, Oppenheimer, Prudential Securities, Prudential-Bache Limited, Rabo Securities, SG Equity Research, SNS Securities N.V., Theodoor Gilissen Securities, UBS, Warburg Dillon Read and Williams De Broe,³⁴ published numerous reports on

Tradeline. I selected Tradeline because it is a well-known and frequently-used data source. The prices from Tradeline were virtually identical to the prices from Bloomberg. Although, there were differences in the volume data between Tradeline and Bloomberg, the average weekly trading volume as a percentage of Shell Transport's shares outstanding available to trade on the LSE based on Bloomberg volume data is 1.82%, which is higher than the 1.8% based on the data from Tradeline and supports the conclusion that the Shell Transport shares traded in an efficient market on the LSE during the Class Period.

³³ See R. Thomas and J. Cotter, "Measuring Securities Market Efficiency in the Regulatory Setting," 63 *Law & Contemp. Probs.* 105 (Summer 2000), p. 111.

³⁴ Analysts that issued analyst reports during the Class Period were identified based on reports supplied by Counsel as well as those currently listed for that period on Thomson Research and Reuters Knowledge.

Royal Dutch and Shell Transport during the Class Period. These reports served the purpose of disseminating publicly available information along with the analysis and recommendations of the analysts to investors.

50. Also, according to data from Thomson Financial, between 10 and 51 analysts provided earnings forecasts for Royal Dutch and Shell Transport during the Class Period. The extensive coverage of Royal Dutch and Shell Transport by securities analysts during the Class Period supports the conclusion that Royal Dutch and Shell Transport equity securities traded in an efficient market during that period.

c) Market Makers

51. The third indicia of an efficient market in *Cammer v. Bloom* is the presence of at least five market makers. Since Royal Dutch New York Shares and Shell Transport ADRs traded on the NYSE, there were no market makers as there are on the NASDAQ. Instead, the NYSE uses specialists to provide liquidity and price stability. Therefore, the presence of an NYSE specialist indicates an efficient market for Royal Dutch New York Shares and Shell Transport ADRs. In addition, it is common legal and economic practice to treat securities traded on the NYSE as being priced in an efficient market.^{35,36,37}

³⁵ Over the period 1999 through 2004, between 2,747 and 3,025 companies, including between 406 and 473 foreign companies were listed on the NYSE, with a total global market capitalization between \$13.4 trillion and \$19.8 trillion (Source: www.nysedata.com)

³⁶ Over the period 1999 through 2004, between 1,465 and 1,945 UK companies with a market value of equity securities between £1.15 trillion and £1.82 trillion and between 351 and 501 international companies with market value between £1.90 trillion and £3.6 trillion were listed on the London Stock Exchange. Source: www.londonstockexchange.com.

³⁷ Over the period 2002 through 2004, between 1,333 and 1,484 companies with total market capitalization between 1.48 trillion euros and 1.8 trillion euros were listed on the Euronext Exchange. Source: www.euronext.com.

52. This factor also addresses the existence of institutional investors and arbitrageurs - sophisticated investors who attempt to profit from trading mispriced securities. If the price of a security is too low, arbitrageurs can profit simply by purchasing the security and holding until it appreciates. If the price is too high, however, the arbitrageur might need to short the stock (sell a stock that the arbitrageur does not own).

53. Generally, institutional investors have significant experience in evaluating investments and assessing the effect of new information on future prospects of a traded company's stock. The following articles comment on the use of institutional holdings as a proxy for market efficiency. Bernard, Botosan and Phillips state "...the [market] inefficiencies appear characteristic of primarily smaller stocks on those major exchanges, or by stocks with little institutional following.... A small number of studies suggest that market inefficiencies are greater when institutional involvement is lower...."³⁸ Barber, Griffin and Lev³⁹ also concludes that, in isolation, institutional holdings are a proxy for market efficiency.

54. Thomas and Cotter argue in their paper that an important available proxy for market efficiency is the level of institutional investors' ownership in a company's stock.⁴⁰

55. During the Class Period, institutions held approximately 49% to 84% of the average Royal Dutch New York Shares Outstanding and 55% to 91% of the average Shell Transport ADRs Outstanding (Exhibits 11 and 12). The large percentage of Royal Dutch New

³⁸ See V. Bernard, C. Botosan, and G. Phillips, "Challenges to the Efficient Market Hypothesis: Limits to the Applicability of Fraud-on-the-Market Theory," 73 *Neb L. Rev* 781 (1994), p. 792.

³⁹ See B. Barber, P. Griffin, and B. Lev, "The Fraud-on-the-Market Theory and the Indicators of Common Stocks' Efficiency," 19 *Iowa J. Corp. L.* 285 (1994).

⁴⁰ See R. Thomas and J. Cotter, "Measuring Securities Market Efficiency in the Regulatory Setting," 63 *Law & Contemp. Probs.* 105 (Summer 2000), p. 106.

York Shares and Shell Transport ADRs by sophisticated institutional shareholders who could act as arbitrageurs facilitates an efficient market directly.

56. The amount of short interest for Royal Dutch New York Shares during the Class Period was between 0.5% and 1.3% of the Average Royal Dutch New York Shares Outstanding and for Shell Transport ADRs during the Class Period was between 0.7% and 10.2% of the Average Shell Transport ADRs Outstanding. Another measure of the level of short interest is the number of days that would be needed to cover the outstanding short position in a month based on the average daily trading volume from the previous month ("days to cover"). The average days to cover for Royal Dutch New York Shares was 2.21 and for Shell Transport ADRs was 6.61. This level of short interest indicates that short-selling in Royal Dutch New York Shares and Shell Transport ADRs was not constrained during the Class Period and that potential arbitrage opportunities that involved short-selling could be exploited.⁴¹

57. The trading of Royal Dutch New York Shares and Shell Transport ADRs on the NYSE and the large institutional holdings that facilitate arbitrage activity both support the conclusion that Royal Dutch New York Shares and Shell Transport ADRs traded in an efficient market during the Class Period.

d) Form S-3 Eligibility

58. A significant indicia of an efficient market in *Cammer v. Bloom* is the ability of the company to file Form S-3 with the SEC. The *Cammer* court found that eligibility to file a Form S-3 "... is an important factor weighing in favor of a finding that a market is efficient."⁴²

⁴¹ The data on institutional holdings and short interest for foreign securities traded on non-US exchanges is not readily available.

⁴² *Cammer v. Bloom*, 711 F. Supp. 1264 (D.N.J. 1989), page 1285.

The threshold requirement for filing an S-3 is for the market value of the company's float to exceed \$75 million.⁴³ The lowest market value during the Class Period for the Royal Dutch New York Shares was approximately \$19.45 billion and for Shell Transport ADRs was approximately \$1.7 billion, significantly higher than the threshold requirement. The lowest market value during the Class Period for the Royal Dutch sharers available to trade on the Euronext/Amsterdam Exchange was \$51.14 billion euros and for the Shell Transport shares available to trade on the LSE was \$31.04 billion pounds. During this period, Royal Dutch and Shell Transport met the eligibility requirement with regard to size to file Form S-3, indicating an efficient market for Royal Dutch and Shell Transport equity securities.

e) Price Reaction to Unexpected New Information

59. Lastly, the fifth factor considered significant indicia of an efficient market in *Cammer v. Bloom* is "... a cause and effect relationship between unexpected corporate events or financial releases and an immediate response in the stock price."⁴⁴ The *Cammer* opinion states that: "... one of the most convincing ways to demonstrate [market] efficiency would be to illustrate, over time, a cause and effect relationship between company disclosures and resulting movements in stock price."⁴⁵

60. During the Class Period, numerous news stories about Royal Dutch and Shell Transport appeared in leading financial publications, including *Barron's*, Business Wire, Dow

⁴³ Float is defined as the number of shares available to trade publicly. For the purposes of Form S-3, float is equal to shares outstanding less shares held by insiders. For Royal Dutch New York Shares and Shell Transport ADRs, I did not find any information relating to insider holdings in these securities. Therefore, I used the Average New York Shares Outstanding and Average Shell Transport ADRs outstanding to calculate the market value of public float.

⁴⁴ *Cammer v. Bloom*, 711 F. Supp. 1264 (D.N.J. 1989), page 1287.

⁴⁵ *Cammer v. Bloom*, 711 F. Supp. 1264 (D.N.J. 1989), page 1291.

Jones News Service, PR Newswire, Reuters News and *The Wall Street Journal*. Appendix A is a chronology from April 8, 1999 to May 31, 2004, that contains headlines from news stories and other sources, together with daily stock prices and volume, percentage changes in the price (returns) for Royal Dutch New York Shares and Shell Transport ADRs, as well as market and industry returns.⁴⁶ The chronology identifies over two hundred days with significant stock price changes during the Class Period for both Royal Dutch New York Shares and Shell Transport ADRs. In the overwhelming majority of cases, there are many news stories that identify significant new information and there is increased trading volume as investors respond to this information, all of which is consistent with the workings of an informationally efficient market for Royal Dutch New York Shares and Shell Transport ADRs.⁴⁷

61. Exhibit 15 presents evidence on how rapidly significant new information is impounded in the prices of Royal Dutch New York Shares and Shell Transport ADRs. Column 1 indicates that there are 113 trading days for Royal Dutch New York Shares with excess returns that are at least 2.58 times greater than the 0.73% daily standard error estimated in the market model regression, which is the 99% significance level. This indicates that significant news is causing investors to significantly revalue the securities. I then check the day after the 113 “big-news” days and find that 32 of these days (28% of 113) have excess returns that are significant at the 5% level of significance. I then check the next day and find only 11 cases (10%) have

⁴⁶ I have included news stories from Bloomberg over the entire Class Period for Royal Dutch only to avoid duplication because the majority of the new stories that appear for search on Royal Dutch and Shell Transport are the same stories. In addition, after identifying the disclosure dates discussed later in this report, I also included news stories from Factiva around the disclosure days to ensure that there was no other news that did not appear on Bloomberg.

⁴⁷ The chronology covers almost 1,300 trading days, documents over 20,000 headlines and printed out is over 800 pages long.

significant excess returns on that day too. By the third day after the big-news day, only 4 cases (4%) have significant excess returns on that additional day.

62. Exhibit 15 also shows the same results when I do this test on Shell Transport ADR excess returns. Of the 146 big-news days for Shell Transport, only 19 (13%) have significant excess returns on each of the following two days, and only 5 cases (3%) have significant excess returns on each of the following three days. These results indicate that the news released on the big-news days was generally impounded into the stock price within a day or two for both Royal Dutch New York Shares and Shell Transport ADRs.⁴⁸

63. I also tested the response of Royal Dutch New York Shares and Shell Transport ADR prices to new information regarding earnings "surprises." Specifically, I examined 20 separate announcements of quarterly financial results made during the Class Period. Announcements of quarterly financial results are generally important events that convey information to investors. One particular important piece of information in such announcements is whether the reported earnings met expectations or whether there was an earnings surprise (reported earnings exceeded or fell short of expectations). Stock price responses to earnings surprises is a highly studied area in financial economics.⁴⁹

64. I analyzed the one-day stock price response in Royal Dutch New York Shares and Shell Transport ADRs to their earnings surprises. I analyzed the one-day excess returns for Royal Dutch New York Shares against the percent difference of reported earnings to earnings

⁴⁸ I note that this is not a perfect check of the speed with which the "big-news" is impounded, because in many cases additional significant information was being released into the market over the next few days. But, this biases the results against finding rapid impounding of big-news.

⁴⁹ See the seminal article R. Ball and P. Brown, "An empirical evaluation of accounting income numbers," *Journal of Accounting Research*, 6 (1968), pp. 159-177.

expectations for each of twenty quarters during the Class Period. I analyzed the same data for Shell Transport ADRs. Both analyses generally show positive stock price responses to large positive earnings surprises and negative stock price responses to large negative surprises. Overall, of the 16 earnings surprises that exceeded 2% (in absolute value), in 11 cases the excess returns for Royal Dutch New York Shares on the disclosure date is the same sign as the surprise, and all but 3 of these 11 excess returns are statistically significant. Similarly, of the 16 earnings surprises that exceeded 2% (in absolute value), in 13 cases the excess returns for Shell ADRs on the disclosure date is the same sign as the surprise, out of which 9 excess returns are statistically significant. Importantly, there were 5 negative earnings surprises (less than negative 2%) that resulted in 5 negative excess returns, of which 3 were statistically significant for Royal Dutch New York Shares and there were 5 negative excess returns, 4 of which were statistically significant for Shell ADRs (see Exhibit 16).⁵⁰

65. This analysis shows a positive correlation between new earnings information and one-day stock price responses. Because announcements of quarterly financial performance will also contain material information not captured in the earnings numbers, financial economists do not expect a one-to-one mapping of earnings surprises and stock price responses. Nonetheless,

⁵⁰ I also checked the price reaction on the earnings releases for the Royal Dutch Amsterdam Shares and Shell London Shares. In order to calculate the excess returns for the Royal Dutch Amsterdam Shares and Shell Transport London Shares, I estimated a market model based on a proxy for the market index over 1995 and 1996 (see Exhibit 17 for details). Out of the 16 earnings surprises that exceeded 2% (in absolute value), in 11 cases the excess return for Royal Dutch Amsterdam Shares on the disclosure date is the same sign as the surprise, and all but 2 of these 11 excess returns are statistically significant and in 12 cases the excess return for Shell Transport London Shares on the disclosure date is the same sign as the surprise, out of which 10 excess returns are statistically significant (see Exhibit 18).

the pattern demonstrated by this analysis further supports the conclusion that Royal Dutch New York Shares and Shell Transport ADRs traded in informationally efficient markets.

66. Therefore, based on my analysis of the data relevant to the *Cammer v. Bloom* factors, I conclude that Royal Dutch and Shell Transport equity securities passed the *Cammer* tests for market efficiency.

ii. Additional Tests of Market Efficiency

a) Bid-Ask Spread

67. Bid-ask spreads are one component of the cost of trading financial securities. The average bid-ask spread for Royal Dutch New York Shares and Shell Transport ADRs during the Class Period was 0.15% and 0.24% respectively (Exhibits 11 and 12).⁵¹ An average bid-ask spread of 0.15% and 0.24% would not be a significant deterrent to arbitrage activity in Royal Dutch New York Shares and Shell Transport ADRs and supports the conclusion that Royal Dutch New York Shares and Shell Transport ADRs traded in an efficient market during the Class Period.

b) Statistical Test for Weak-Form Market Efficiency

68. I also conducted statistical tests to determine whether the stock returns for Royal Dutch New York Shares and Shell Transport ADRs exhibited autocorrelation. Significant autocorrelation implies a statistical relation between stock returns over consecutive days. If there exists a strong enough statistical pattern by which yesterday's stock return allows an observant trader to profitably predict today's stock return, this would violate weak-form market

⁵¹ The data for the closing bid and ask prices for the NYSE trading was obtained from Bloomberg.