Panama Canal Dry – Bulk Market Segment Peer Review

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Introduction

The Dry Bulk Market Segment Study prepared by Nathan and Associates consists of 6 volumes. Volume 1 is a summary of the remaining volumes and will therefore not be explicitly reviewed here. The 6th volume is primarily a compilation of tables, with the textual background, information, and analyses being presented in Volumes 2 through 5. In this review, we will state the objective for each volume, as provided in the Terms of Reference, followed by General Comments, which will then be supplemented with specific comments and observations.

The focus of these comments is on the content and conduct of the study. We take the perspective of a financial analyst that is being requested to commit significant resources based on this study. However, where we spotted typographical errors that could affect the ability of the reader to understand the text, we mention them as well.

Title: Volume 2: Panama Canal's Potential Market

Objective as Stated in Terms of Reference: Requirements 5.1: Determine the potential market for the dry-bulk segment.

> For each commodity of this segment as described in sub-paragraph 4.2, the contractor shall determine the Canal's yearly potential market by cargo (expressed in terms of metric tons and metric ton-miles) by vessel size and by route.

The Introduction section of Volume indicates that the assessment of the Canal's potential market for dry bulk is presented in this document. The Canal's potential market is defined as the maximum market share that the Canal could capture of world trade assuming a value of zero for Panama Canal tolls.

General Review Comments

Production/consumption (Supply/ Demand) scenarios are bases on expert opinion without any explanation as to the basis for the opinion. The text reads *"The analysis of dry bulk commodities is based on the judgment of CRU experts"*, and throughout the text there is no further explanation as to how the analyses were developed, with the exception of a few commodities that are referenced, such as the Zinc Metal Trade on page 74. Because this is the basis that is used for the complete dry bulk analysis, it is imperative that the authors explain with more detail the methodology followed in determining forecasts for each commodity.

The document is poorly referenced, especially in key assumptions about supply and demand scenarios that are critical for the production of forecasts. This is extremely important for this particular market segment because no econometric model was used; therefore a detailed explanation of methodology and reference to industry standards or any other support for assumptions should be provided. Throughout this volume the phrases "is projected" and "is

expected" are used, but rarely is a discussion provided of how this projection was calculated or why its validity should be accepted. Further, the document states that data were used "…depending on the view of the experts on which data set is most reliable…". It is suggested that the author specify on what basis this judgment is made.

It seems that there is inconsistency and potentially a large error in the overall calculations because of differences in the units of measurement. Long ton units are used in tables 2-8 through 2-11 and are inconsistent with the tables from chapters 3 through 6 that use metric tons. Units and Potential Panama Canal Trade figures do not match on tables 3-5 and 3-6, as well other tables throughout the document (4-1 and 4-2, 4-5 and 4-6, etc). The author should restate the units of measurement throughout this volume and make sure that there is no error in the forecast that is used in the subsequent analyses. The Terms of Reference call for use of metric tons for the forecast.

Specific Review Comments

1. Page 2, Table 1-2.
The document lists study regions "delineated for their significance for potential Panama Canal trade." It does not provide the basis or background for the determination of the significance of these regions.

2. Page 3, Dry Bulk Production and Consumption
The first paragraph states that the "experts" put together "the available historical series of data into a standard format and then used their expert judgment to make forecasts." In the second paragraph it states that "the forecasts are driven, however, by expert judgment rather than an econometric model….*No econometric models were developed for this study…supply is based on the experts' view of the future availability of supply from different potential sources…"some pre-existing models were used in a few cases"*. The author needs to explain why econometric models don't provide useful input to the process.   It seems that at least such models would provide some kind of reference or reality check. Also, vague references are made to pre-existing models that are used for certain commodities. In various commodity forecast sections that follow, these models need to be described and explained, and their inputs and outputs need to be provided in detail.

3. Page 5, Table 1-3.
In comparing Tables 1-3 and 1-1, we found that there is no reference made in Table 1-3 for sources used for Lumber, Paper, and Pulp on the Other Dry Bulks, as well as Misc. Metals, Misc. Ores and Misc. Fertilizers. For Coal, some rather important numbers are derived by inference. Is there a benchmark that can be used to be sure that these inferences are being applied correctly? On the line for Nitrates, reference is made to "in-house consumption estimates". What, specifically, does this refer to?

4. Page 6, Implications of Continued Implementations of Free Trade Agreements
The author mentions that the only implication of Free Trade Agreements would be in the steel industry and explains the effects on raw material flows for this industry. It is important to clarify if the author does not foresee any changes in other commodities, i.e. cement, lumber, etc due to regional free trade agreements, and the reasoning leading to this conclusion. The author also

discusses trade in context of FTA's and then discusses the role of specifically Russian and Brazillian steel mills without much reference to FTA's. If the reviewers are going to discuss specifically these, why not discuss China in this section also, which is moving to become a major metals producer, raw materials consumer, and trade force? (see 4/21/03 Gulf Shipper: *China grows into major metals trader*).

5.   Page 11, Forecast of Potential Canal Trade
The document reads *"Forecasts for potential canal trade for dry bulk commodities were prepared based on the approach and methodology discussed in Section 1"*. Refer to the general comment that mentions that the methodology is not explicit enough to support how the forecasts were produced.

6.   Page 12. Table 2-3
There is no explanation as to the methodology used to arrive at the forecast in this table. Is this the result of the forecast by commodity described in sections 3 through 6? Clarification is required. In comparing the "Actual" Origin/Destination volume data from Table 2-1 for Years 2000 and 2001, with the same years for the "Estimated" O/D volume data from Table 2-3, there are data inconsistencies throughout these tables, leading the reader to question the validity of the estimates. As one example from the first line of the table, "actual"2000 and 2001 trade volumes shown in Table 2-1 for North America Gulf to the Far East are 7,801 and 5,317 thousand long tons, respectively, while the corresponding "estimated" volumes for those years and route shown in Table 2-3 are 7,289 and 7,462 thousand long tons.

In addition, there appear to be significant reversals of recent historical trade-route / commodity trends as shown in Table 2-1 for the 1995-2001 period, and the projected period for 2000-2005 shown in Table 2-3. For example, the North America Gulf to Far East route saw a 14.4% average annual *decrease* between 1995-2001 according to Table 2-1, yet the same route is projected to have a 2.5% average annual *increase* between 2000-2005. The Africa to Oceana route saw a 29.6% average annual *increase* between 1995-2002, yet is projected to have a 1.4% average annual *decrease* from 2000-2005. Discussion of these anticipated trend reversals does not appear to be provided in any detail throughout the document aside from select discussion of trends for individual commodities.

7.   Page 13, Figure 2-3
The trend lines shown for Figure 2-3, and for similar tables throughout the rest of the document (Figures 2-4, 2-5, 3-1, 4-1, etc.) all show slight "hiccups" – marginal increases and decreases – particularly around years 2010, 2015, and 2020. I t would assist the reader if the nature of these discontinuities were discussed.

8.   Page 14, Potential Capture of Canal Bypass Routes
Here and throughout the study documents, reference is made to "an expanded or restricted Canal". It appears that "restricted" means "existing". If such is the case, the term "existing" should be used to avoid confusion. If this is not the case, the term "restricted Canal" needs to be defined.

9. Page 14, Potential Capture of Canal Bypass Routes
In the first paragraph the document states that "*the only bypass trades involve all-water routes.*"
While this may be true, at no point in the study documents is there a discussion of how some of
the products produced in North America might move from West Coast ports to East Coast or
Gulf Coast ports, or a discussion of why they would never do so. After the recent labor unrest on
the West Coast, the Gulf and East Coast ports have seen sharply increased interest in all-water
service to their terminals, as opposed to land bridge connections. Since such a shift would have
a direct effect on Canal traffic, it seems that such a discussion is warranted.

10. Page 16, First Paragraph
States that bypass trades "have been identified by first noting…" but then what follows on after
that step (second, third, etc.) is never delineated.

11. Page 18, Best and Worst Case Results.
Best and Worst Case scenarios are important parts of the requested analysis. The author
mentions that various demand elasticity estimates were used to prepare the Best Case and Worst
Case scenarios; however there is no explanation whatsoever on the source or rationale behind the
elasticity of demand relative to the GDP.

12. Table 3-3, Iron Ore:
The table shows that the projected Potential Panama Canal Trade for the Most Probable Case is
substantially larger (3 times) than the Best Case projected forecast. The table needs to be
corrected and the overall forecast should be reviewed to avoid carrying this error forward
throughout the analysis

13. World Supply, Demand, Trade and Potential Canal Trade, Estimated and Projected
    2005-2025 tables (odd number tables sections 3 through 6)

The source of World Supply, World Demand, and World Trade figures for each of the
commodities under analysis is not provided. These figures are important for the overall analysis
and therefore should at least be clearly referenced.

Year 2000 World Demand figures should be equal in all scenarios. This is supposed to be a
fixed variable independent of the Most Probable Case, Best Case, and Worst Case scenarios.
The author should correct this error throughout the report and verify that it does not affect the
overall forecast.

14. Page 36, Iron Ore Demand
Iron ore demand is calculated using a *"Rule of thumb of 1.55 tons of iron ore …"*. The analyst
needs to explain the source of this figure and define if it is based on industry standards.

Iron ore demand growth is mentioned to be based on several "growth factors"; however there is
no explanation or source for these factors.

15. Page 37, last paragraph, and Table 3-4.
It appears that "South America East', should be "South America West". There is no need at all for the Canal between SAE and the Caribbean Basin or SAE and North America East.

16. Page 49, Thermal and Metallurgical Coal
The last paragraph discusses that "*The thermal coal market* [used principally in utility/energy markets] *is much larger than the metallurgical coal market.*" While it is understood that it is difficult to distinguish between the two from the data sources, it would seem to be more accurate to list this category under the Other Dry Bulks category (Table 2-11) rather than the Other Ores and Metals category. If not, then by the same reasoning the Petroleum Coke commodity should be moved from Other Dry Bulks to Other Ores and Metals, since "…the aluminum industry is the major consumer of *calcined coke*" (p. 125) and calcined coke makes up approximately 20% of the Petroleum Coke category according to online sources.

17. Page 63, Copper concentrates
The analyst should clarify if the assumed 30 percent average copper content in concentrate is an industry standard.

18. Pages 77 and 79. Miscellaneous Ores and Metals
There is no discussion of background, assumptions, or industry trends for these two commodities. There is also no discussion of what metals are included in this category. The analysis requires a clear statement of category content.

19. Section 5 Minerals and Fertilizers
The analysis of Nitrates, Phosphates, Sulphur, and Urea included various sub-sections that present a complete set of historical information, and forecast supply and demand. The sections that these 4 commodities have include Historical Demand 1990-2000, Forecast Demand 2000-2025, Historical Supply 1990-2000, and Forecast supply 2000-2025. It would be advisable to include these sections in the analysis of all the commodities to clarify the methodology. If different methods were used to analyze the commodities, it would be important to specify why they are different.

20. Page 113, Miscellaneous Fertilizers
No discussion is provided here at all. Some background and assumptions need to be given.

21. Pages 116 and 117, Sugar
The analyst should specify the source of the refined sugar production and world consumption historical figures.

22. Pages 121 and 123, Cement Forecast
Twice in this section, the author asserts that Canal traffic is expected to rise initially, and then fall significantly between 2010 and 2015, winding up at the same levels in 2025 as existed in 2000. No reason for these projections is provided.

Typographical and other errors

23. Page 6, Implications of Continued Implementations of Free Trade Agreements
In the paragraph on Iron ore, the last phrase should read "this could reduce *potential* Canal traffic."

24. Page 14, Commodity Categories and Commodities
In the third line of this section the words "to increase" are missing.

25. Page 35, Iron Ore.
In the second line, "400 tons" should be "400,000" tons.

26. Page 40, International Trade – General
Paragraph states "…is unlikely to change *hugely*…" Perhaps other wording such as "…is unlikely to change significantly..." would be more appropriate. Other examples in the document include p.63, "…*what used to be* U.S. manufacturing…"; pp. 66 and 74 "…is forecast to rise *a little too*."

27. Page 47, Thermal Coal and Metallurgical Coal
In the third line, "5,094 tons" should be "5,094,000 tons".

28. Page 49, last sentence
There is inconsistency between the use of "million" and "billions". This confusion is also reflected in Tables 4-1 (billions) and Table 4-2 (millions). The tables and text need to be reviewed and corrected to reflect the correct order of magnitude in all cases.

29. Page 77. Miscellaneous Ores
On the second line, "1,755 tons" should be "1,755,000 tons".

30. Page 102, next to last paragraph
The document projects a level of "5124 million tons", which would equal more than 5 *billion* tons. This cannot be correct.

31. Page 105, 6th paragraph
In the first sentence the word "increase" should be inserted after "expected to".

32. Page 106, Supply
 In the last sentence is the reference to year 2020 or 2025?

Summary of Comments

1. The analysts make too many assertions and forecasts without providing their sources of information, models employed, or reasoning behind their statements. For a project of this magnitude, an estimate with no substantiation will not hold up under scrutiny.

2. Units of measurement are inconsistent, leading to some concern that numbers could be off by a significant margin.

3. Each of the commodities seems to be analyzed in a different manner, using different methodologies. This is appropriate in some cases, but there seems to be a lack of stated rationale underlying the approach for many of the commodities.

4. For commodities with significant supply quantities in North America, no consideration is given to the possibility of using rail services to alter shipping routes. Given the aggressive marketing by North American railroads, this needs to be included in the analysis.

Recommendations for Improvement

1. For each commodity, provide a description of: sources of data, models employed, and the methodology used to develop forecast.

2. Where pre-existing models are used, provide the details of how the models work, including inputs and outputs. Also, provide illustrations of how well the models have worked in the past.

3. Where assumptions and inferences are made, explain the underlying rationale. Show how these assumptions and inferences explain past/current behaviors in the marketplace.

Title: Volume 3: Vessel Transit and Fleet Size

Objective as Stated in Terms of Reference: Requirements 5.4: Determine traffic, transit, revenue flows and risk

The contractor shall provide and fully justify:

5.4.1   Forecasts for key Canal variables

    5.4.1.1   For the two Panama Canal cases described in sub-paragraph 4.1, the contractor shall provide forecasts for the following key variables:

        5.4.1.1.1   Cargo (in metric tons) by commodity and trade route

        5.4.1.1.2   Transits by vessel characteristics and dimensions characteristics, and other key variables according to the contractor's proposal as accepted by the ACP prior to the award of the contract

        5.4.1.1.3   Transits by country/port of origin and destination for each trade route

        5.4.1.1.4   Transit revenues by trade route, laden/ballast distribution, and direction

    5.4.1.2   For the performance of this task, the contractor shall take into account growth trends of dry bulk carriers and their deployment over particular routes. The contractor may select the analytical tools to be used in the performance of this task; however, due to the new dimensions of the expanded Canal, if the contractor decides to use an econometric model, the techniques used for these forecasts shall not be limited to this tool.

    5.4.1.3   The contractor shall identify the specific factors that influence each of the key variable's forecasts

5.4.2 Risk Analysis

    For each forecast of all key variables described in sub-paragraph 5.4.1, the contractor shall conduct a risk analysis forecast for three (3) case scenarios: optimistic, base line, and pessimistic. The contractor shall fully justify the underlying assumptions included in each case scenario. The contractor shall compare tables and graphics considering the scenarios in this section and the forecast developed as required in sub-paragraph 5.4.1.

The author indicates in the Introduction section that this Volume presents the vessel transit and fleet analysis for the Existing Canal and an Expanded Canal. The objectives of this part of the study center on four inter-related elements - World Fleet Analyses and Forecasts, Seaborne Freight Costs, Seaborne Cost Differentials, and Vessel Laden and Ballast Transits.

The author mentions that achievement of these objectives was facilitated by the development of analytical tools for use in the forecast of Canal transits and freight costs.

General Comments

The framework established by the analysts for this section appears to be valid, but certain aspects of the implementation are weak.

The decision was made to consolidate grains and other dry bulk forecasts for the purposes of predicting the composition of the world fleet, thus ensuring one internally consistent framework for forecasts of transits of vessels carrying grains and other dry bulk cargoes. This appears to be a good approach.

The various models that are used in this volume (such as the Voyage Estimating Model, the Transit Model, and the Scrapping Model) should have been validated by contrasting model outputs with actual historical conditions. While a fair amount of detail is provided for the Voyage Estimating and Transit Models, almost no detail is provided for the Scrapping Model. These models are crucial to the validity of this study and need to be fully documented and validated.

Where certain assumptions are made and parameters employed, sensitivity analysis should be conducted to determine how critical these assumptions and parameters are to the validity of the outputs/results. Where parameters are determined to be sensitive to assumptions made by the analysts, further discussion and investigation is merited. There is a lack of such sensitivity analysis throughout the report.

Due to the size and number of tables and charts and the limited time we had for analysis, our review did not check the accuracy or completeness of the tables and charts provided in this volume

Specific Comments

1. Page 14, Existing Canal
The document states that regressions undertaken on a route basis did not provide statistically acceptable results. The statistical results are not presented to corroborate their finding.

In the third paragraph from the bottom, the document states that the "number of DWT size ranges into which transit forecasts are being divided in these studies is large and much larger than is normally considered to be representative of the market." For comparative purposes, the author should state what the more "normal" range might be.

2. Page 22, Forecasting Future DWT Trends
In this section the author presents efforts to forecast DWT trends. The analysts chose to perform regression analyses to predict the percentage of traffic to be represented by each DWT size range. As the authors noted, using regressions in this manner can cause the total size of the fleet to exceed 100%. A more sound approach would have been to use total tonnage within a size category as the dependent measure. Also, the analysts need to report whether the independent variables in the estimated equations are statistically significant at the usual levels.

3. Page 35, Forecast Approach

The first paragraph after the bullets states, "It is believed that there is no statistical evidence for the use of varying utilizations over time." This needs to be explained.

4. Page 36, first paragraph

In the Forecast Approach section, the author mentions that the mean values from 17 years of historical data were used, however the results created anomalies. These anomalies were not specified in the report.

5. Page 37, Expanded Canal Scenario

The analysts assume that utilization levels for vessels in the 60,000 to 100,000 DWT range will increase to 82% for Northbound transits and fall between 85% and 86% for Southbound transits. Some explanation of how the author arrived at this assumption is merited and would add to the understanding of conclusions drawn from this estimate.

6. Page 37, Conversion Factors for PCUMS, Gross Tonnage, LOA, Beam and Draft From DWT

The approached used for conversion factors for PCUMS, gross tonnage, LOA, beam and draft from information on DWT appears reasonable.

7. Page 39, Analysis of Ballast Transits and Page 219, Methodology for Voyage Estimates

An analysis of historical ballast transits is discussed in fairly great detail on Page 39. Later in the Methodology Section, the decision is made to ignore ballast transits as explained in the following paragraph:

"The freight rates calculated for other dry bulks in this study exclude any ballast voyage. They relate to the laden passage—including load and discharge port times—only. The results therefore will be seen to differ from spot freight rates quoted in the market. The spot freight rates reported by, for example, Clarksons include a provision for a ballast or positioning voyage. However for the purposes of this study, as discussed previously, the important consideration is the *difference* between freight costs via the Canal and those on least cost alternative routes. The ballast voyage will be common to both options. Moreover, the precise nature of the ballast voyage will vary dependent on trade and market conditions. To include the ballast voyage in this instance is to introduce a level of spurious accuracy. The exclusion of the ballast passage is, as we understand it, also consistent with the approach adopted in the study being undertaken for ACP on the Tanker Segment."

It would seem that if existing/historical trade routes were to shift significantly, the percentage of ballast voyages on a given route could also shift significantly, thereby affecting the comparison of the cost of one route versus another. This possibility is not examined in the document, but should be. An analysis of the trade routes of various bulk carriers and the types of commodities they haul on the various segments of the route might provide insight into the origins of ballast transits.

8. Section 4, World Fleet Development by Size

The source of the data on the world dry bulk carrier fleet is not given.

9. Page 99, Analysis of Trends in the World Dry Bulk carrier Fleet by Size Range
It is noted that there is a "dearth of tonnage" that exists in the 80,000-120,000 DWT size range. The reasons for this are not explained. Is it possible that with a new canal there would be incentive to develop this size range?

10. Page 103, Dry Bulk Carrier Scrapping Model
While the methodology framework appears to be valid, the actual working of the model and its validity are not discussed in detail. More information on this model would be helpful. Is it based strictly on age of vessels, or are other parameters involved? If other parameters are involved, will the change in the dimensions of the Canal cause these parameters to change?

11. Page 105
In the fourth paragraph, the document states that a number of regressions were tried for the size range below 50,000 DWT, but the results were not robust. Information should be provided as to what regressions were used and what results led to a determination that they were not robust.

12. Page 179ff, Preliminary Responses from the Delphi Panel
This discussion is not very helpful due to the limited number of respondents and their widely divergent viewpoints. It would be more helpful to focus on those points where the panelists generally agreed, or because of their occupation were able to provide unique insights.

13. Page 211, Analysis of Future Ship Costs and Prices and the Determination of Freight Costs
These analyses/models should be validated by examining how well they approximate historical rates and costs. Some type of validation needs to be conducted.

14. Page 216, Sensitivity of Freight Differentials Between Canal and Alternative Routes to Changes in the Market
The last paragraph of this section attempts to summarize the analyst's findings, but it is very confusing. The statement that bunker costs are almost as important a factor as the charter rate doesn't seem warranted when the bunker cost differentials run from 36% to 53% of the time value of the vessel. In other words, the time value of the vessel accounts for 60% or more of the differential

15. Pages 219, and 229 Methodology for Voyage Estimates
The document state the exclusion of ballast passages is, as the analysts understand it, consistent with the approach adopted in the study being undertaken for ACP on the Tanker Segment. This should be verified and stated positively or omitted.

Typographical and other errors

16. Page 26
The last sentence states "the regression equations derived are shown below", but the rest of the page is blank. These equations should be provided in order for reviewers to check their validity and accuracy.

17. Page C-6, Insurance
On the third line, "1998" should be "1988".

18. Page 83 (Chapter 3), Table "Other Dry Bulk Ballast Transits (Cont."
This appears to be a continuation of the table presented on Page 43 in Chapter 2.

19. Page 107, Existing Fleet
It appears that the title should be "Existing Canal".

20. Page 231, Grain Cargoes
Shouldn't the title be "Other Dry Bulk Cargoes"?

Summary of Comments

1. The differential in rates between Existing Canal and Expanded Canal scenarios is the one single factor that will most heavily influence the economic viability of a potentially Expanded Canal. The analysts do not check the results of their models and assumptions against "real world" values to see if their analysis is adequate. This lack of validation places the validity of the entire study in jeopardy.

2. As mentioned for Volume 2, the sources of much data and the rationale for many assumptions are not clearly identified and discussed.

3. There is a lack of sensitivity analysis on the various assumptions made in this volume.

Recommendations for Improvement

1. Where assumptions are made, their logic needs to be provided and the sensitivity of the forecasts to these assumptions needs to be tested. Where there is significant sensitivity, a more complete description of the assumption and rationale behind it should be provided.

2. The rates produced by the models need to be compared to actual rates and data. While there is much discussion as to why their model doesn't correlate directly to spot market rates, no discussion is provided as to how well the model provides a reliable indicator of rates and differentials. Theory is often quite different from what happens in the marketplace, but no validation is offered. Furthermore, an accurate model should come close to real world figures over a long term where "momentary" fluctuations can be ignored.

3. Provide the details of the Scrapping Model and some validation data.

Title: Volume 4: Economic Value of the Panama Canal

Objective as Stated in Terms of Reference: Requirements 5.2: Determine the economic value of Panama Canal routes versus alternatives for the existing Canal and the expanded Canal after 2010.

5.2.1   For the present Canal, and for the expanded Canal on 2010 and 2025, the contractor shall provide an estimate of the economic value of the Canal's main and potential trade routes, as compared to other alternative routes and other transportation means. The economic value shall be expressed in terms of $/metric tons and $/metric ton-miles. In determining the economic value the contractor shall take into account, among other factors:

   5.2.1.1 Potential substitution of traditional points of origin and destination due to new production sources, new consumption patterns, technological changes and products substitutes

   5.2.1.2 Total transportation cost of Canal routes

   5.2.1.3 Differential transportation cost between Canal routes and its alternatives in dollars per measurement unit

5.2.2   For the expanded Canal, the contractor shall also consider dry bulk carriers dimensions and characteristics, as well as the value-added from an expanded Canal service in terms of decreased delays, greater cargo utilization rates, and cost savings due to larger drafts and shorter routes compared to other alternatives

 5.2.3   The contractor shall determine the relative margin between the economic value of the existing and the expanded Canal on 2010 and 2025.

The author indicates in the Introduction section of this Volume that this document presents the determination of the economic value of the Existing and Expanded Canal. The determination of the economic value of the Canal has three elements:

- The determination of total seaborne transportation costs by route for projected Canal transits for the Existing Canal and their comparison with total transportation costs on alternative routes, including the incremental interest costs associated with having cargoes at sea for longer durations than would be the case for shorter routes through the Canal;

- The determination of total seaborne transportation costs by route for projected Canal transits for the Expanded Canal and their comparison total transportation costs on alternative routes, including the incremental interest costs associated with having cargoes at sea for longer durations than would be the case for shorter routes through the Canal;

- Calculation of the greater economic value that would be achieved through expansion of the locks versus the Existing Canal.

For the Expanded Canal, consideration has been given to the dimensions and characteristics of dry bulk carriers, as well as the added value from an Expanded Canal service in terms of greater cargo utilization rates and cost savings due to larger drafts and shorter routes compared with other alternatives. This part of the study also determines the relative margin between the economic value of the Existing Canal and the Expanded Canal, from 2010 through 2025.

General Comments

The document states that the "economic value of the Canal refers to the transportation cost differential for specific commodity route pairs through the Panama Canal as compared to the least cost alternative routing". From a transportation-only perspective, this seems appropriate. However, relative to expansion funding, it may be advisable to bundle these benefits with water management benefits and other environmental and recreational advantages to be derived from undertaking the expansion.

Specific Comments

1. Page 2, Approach
The definition of economic value and the approach to calculating it appear reasonable.

2. Page 7-8, Ocean Freight Rates
See Note 7 for Volume 3 **"Page 39, Analysis of Ballast Transits and Page 219, Methodology for Voyage Estimates"**.

3. Pages 7-8, Ocean Freight Rates
As discussed in comments on earlier volumes, ignoring ballast transits may not be the best approach. The effect of having to return from a voyage in ballast could reduce what otherwise appears to be a positive economic value for the Canal. The reasons for ballast transits and who seems to make them are not provided.

4. Pages 9-10, The structure of the Economic Value Model and Inputs
The overall model structure appears to be correct, except for the inclusion of the "incremental interest or inventory cost". There are two concerns with including inventory costs. (1) Freight costs already take travel times and other logistical matters into account. If this element is to be included, then the model should incorporate the total logistics costs of each origin-destination segment. (2) The incremental "inventory cost" is usually absorbed by the shipper or the receiver depending on the terms of sale. Routing decisions are not made on the basis of inventory costs, and therefore will not affect the decision to use the Canal.

According to the study document, Incremental Interest Expense fluctuates from 5 to 25% of the dollar-per-ton Economic Value of the Canal. This greatly affects the results in terms of estimating transits that could be captured."

5. Page 11, Results and Table 3-6.
It might be useful to indicate the present value of the economic transportation savings to be generated using an appropriate discount rate in order for the financial community to determine if

the amount requested for funding is appropriate. The use of present values also provides a common basis upon which all financial scenarios can be compared.

Summary of Comments

1. This volume appears to be fairly straightforward. Other than the issue of ballast transits and the potential usefulness of present values, no major items were noted.

Recommendations for Improvement

1. Analyze ballast transits for their possible effect on the outcome of the analysis.

2. Consider revising the presentation of the economic data to make it easier for a financial analyst to compare results across studies, using accepted financial metrics.

Title: Volume 5: Marketing Strategy

Objective as Stated in Terms of Reference: Requirements 5.3: Develop and propose a marketing strategy

5.3.1   The contractor shall propose and fully justify a marketing strategy that takes into account the existing Canal and the expanded Canal after 2010. This marketing strategy shall determine the optimum price system that best serves the segment, the best unit of measurement to assess such price system, and the proper schedule of events and the cost to implement this system.

 5.3.2   The marketing strategy shall pursue the following objectives:

   5.3.2.1   Maximize Canal's earnings

   5.3.2.2   Maximize the Canal's market share for the dry bulk segment

   5.3.2.3   Be non-discriminatory within the dry bulk segment

 5.3.3   For the development of the marketing strategy, the contractor shall analyze, among other elements, supply-and-demand by commodity (as described in sub-paragraph 4.2), routes, and vessel size.

The Introduction section of Volume 5 of the Draft Final Report mentions that this document presents the analysis and recommendations for a marketing strategy for the existing and expanded Canal. The recommended marketing strategy identifies an optimum pricing strategy for the dry bulk market segment including the structure and rates for Canal tolls and its implementation.

Specific Comments

1.   Page 4, Rate Structure
The third paragraph of the section states twice that Canal tolls differentiate between laden and ballast vessels.

2.   Page 6, Achievement of Underlying Objectives
This section relies heavily on a study conducted by Arthur Andersen & Co. in 1970. This seems very dated. From a financial analyst's perspective, it would be important to prove that the cost and operational structures of the Canal have not changed significantly since the study. This issue might be resolved through a sensitivity analysis which would show that the various elements of the study that Nathan is relying on wouldn't affect the outcome of the Marketing Strategy, if such is the case.

3. Page 8
The third paragraph of the text and the first paragraph of the indented quotation both reference a Paragraph 1(c) of the treaty, although one paragraph mentions Article II and one mentions Article III. Are they indeed separate Articles, or is there a typographical error here?

4. Page 17, Commodity Prices
The paragraph states that dry bulk prices were obtained from CRU International, Ltd. How does CRU International obtain its prices?

5. Page 18, Review of Alternative Panama Canal Marketing Strategies
This section references several tables that are labeled as "Table 4-X", but no such tables are included.

6. Review of Alternative Panama Canal Marketing Strategies
Reference is made to using 10% and 5% discounts on certain commodities. How were these discounts established? What is the rationale?

7. Page 19
In the next-to-last paragraph, the statement is made, *"The forecast for the Expanded Canal shows slightly lower transits and revenues than the Existing Canal scenario due to a larger average vessel size despite the slight increase in cargo volumes."* Our review suggests that the toll-pricing strategy has not been optimized if revenues are projected to decrease under the expanded canal scenario. The determination of the optimal strategy needs to be reworked.

Summary of Comments/Recommendations for Improvement

1. The largest concern with this volume is that it proposes, under the expanded canal scenario, a pricing strategy that reduces the ACP's revenues. This seems unrealistic given the general growth in bulk commodity world trade.   The optimal strategy needs to be re-analyzed.

2. This volume relies very heavily on a study conducted in 1970. Either the analysis needs to show that the study still reflects reality, or it should prove that the outcomes of the analysis are not very sensitive to variations in the data provided by the study.

3. As with the other volumes, there is a lack of detail. If CRU International's dry bulk prices are going to be relied upon, a description of how CRU obtains these prices should be provided. Also, how were the discounts for the various commodities chosen, and how was it determined which discount would be applied to which commodity? This explanation needs to be provided.

Title: Volume 6 –Forecasts of Panama Canal Transits, Cargo and Toll Revenue

Objective as Stated in Terms of Reference: Requirements 5.4: Determine traffic, transit, revenue flows and risk.

Refer to page 10 Volume 3 for a detailed description of this section of the Terms of Reference.

The introduction section of Volume 6, mentions that this document presents the forecast of Panama Canal Transits, Cargo and Toll Revenue through 2025 for the Existing canal and Expanded Canal cases.

Summary of Comments

This volume is essentially nothing but tables. Some type of description needs to take place to point out what the reader should be observing and how these tables support what has been analyzed in earlier volumes.

SUMMARIZING THOUGHTS

1. The validity of this study is compromised by the use of too many assumptions that are not supported with good rationale and a lack of specificity concerning models that are used for demand/supply estimates and for pricing and economic value calculations.

2. The shipping rates generated by the models in this report, which are the foundation of the economic value determination, are never validated by comparing them with actual rates.

3. The end result of this study is a reduction in revenues to the Canal. There is a problem with the development of the optimal pricing strategy that must be resolved.

4. With so many assumptions, model characteristics, and data sources left undocumented, this study will likely not provide the level of assurance financial analysts seek when deliberating investment decisions.