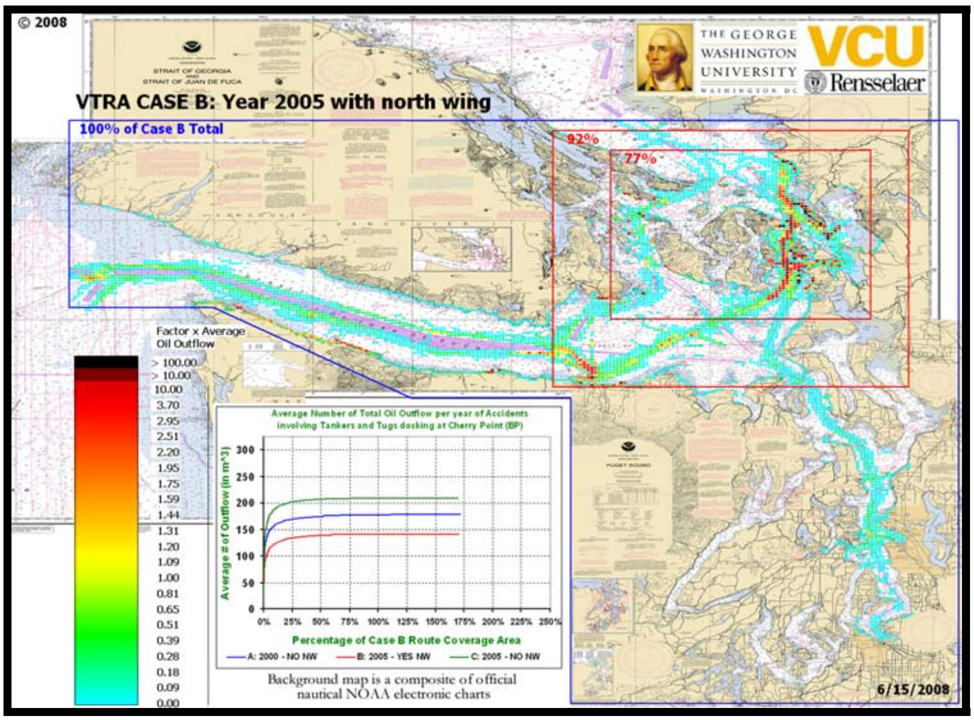
A RESPONSE TO SEVEN ADDITIONAL QUESTIONS RELATED TO THE VTRA PROJECT



Assessment of Oil Spill Risk due to Potential Increased Vessel Traffic at Cherry Point, Washington

Submitted by:
Johan Rene van Dorp (GWU), Jason R.. W. Merrick (VCU)

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The answers below are in response to the seven questions (the "Questions") that were raised by the CORPS in their attachment to their e-mail of April 20th, 2009, and intended to "aid the CORPS and USCG in formulating the scope of additional work that they anticipate requesting from the VTRA Team." These questions appear to request further clarification from the meeting between, BP, ENTRIX, USCG, the CORPS and the VTRA team on February 3rd, 2009 at The George Washington University in Washington, DC and to further enhance their understanding of the contents of the VTRA Final Report and VTRA Final Report – Addendum. Prior to this request, the VTRA also submitted a presentation on February 23rd, 2009 addressing a particular question that was raised during the February 3rd meeting.

Some of the Questions raised return to issues that have been asked before and have already been answered in depth by the VTRA Team. Despite this and the fact that the contractual obligations of the VTRA Team have been satisfied and the contract between BP and the VTRA Team has ended, the VTRA Team has provided a response to all the Questions to all the participants of the February 3, 2009 meeting as a further act of good faith and professional courtesy. These responses are provided without making any commitment that members of the former VTRA team will agree to any new contract to perform additional work.

The answers below refer back to previous submitted materials and past discussions to further assist others in being able to move forward.

Question 1:

BP Cherry Point Dock Traffic Forecast vs. VTRA BP Dock Vessel Call Counts

The traffic levels presentation includes the traffic forecasts provided to the VTRA Team by BP (expected number of calls at Cherry Point for high, medium and low future scenarios and current range of operations) and the values selected from the future traffic forecasts that were used to determine the change in transits used in the simulation. It also shows the actual number of calls that occurred in the simulation. Using the information from the presentation the table below was prepared showing the range of calls at Cherry Point from the VTRA Main Report Appendix J (the BP forecast as revised by the VTRA Team) and the actual number of calls that occurred in the simulation (traffic levels presentation, page 19). This table seems to show that in each case the number of Cherry Point calls as counted by the simulation is below the lower end of the BP forecast. Why do the simulation results fall significantly outside the forecasted range provided by BP?

Table F-1 Main Report Appendix F (Also AD-14)	Simulation Results – Number of Calls with North Wing in Operation
170 – 220	Case D - Low 2025 106
340 – 370	Case F - Medium 2025 283
350 – 450	Case H - High 2025 332
320 – 400	Case B 261

Response:
We were tasked to assess system-wide vessel traffic risk of BPCHPT vessels in terms of accident frequency and oil outflow. To accomplish the assessment of system wide accident frequency we first used the best available data to model the VTRA Case B maritime transportation system simulation. The VTRA Case B maritime transportation risk simulation serves as a tool to geographically distribute historically observed accident rates across the VTRA study area. We have accomplished the assessment of system wide accident frequency by calibrating accident scenarios generated by the VTRA Case maritime risk simulation to historically collected BPCHP vessel incident and accident data. This calibration process resulted in the evaluation and assessment of a geographic system wide vessel traffic accident frequency profile across the VTRA study area. Next, an additional oil outflow model analysis layer was used to accomplish the assessment of system wide and geographically dispersed average annual oil outflow volumes associated with accidents involving BPCHPT vessels. The VTRA Case B maritime simulation was adapted to model low, medium and high traffic scenarios. System wide accident frequency and oil outflows were evaluated using these adapted versions of the VTRA Case B maritime transportation risk simulation.

The main data source for the modeling of traffic for the VTRA maritime simulation is the VTOSS database. This database describes vessel movements throughout the VTRA Study area that call-in to one of the vessel traffic services within the VTRA study area. The VTOSS database and its use for the modeling of vessel movements throughout the VTRA study area was described in more detail in Technical Appendix C of the VTRA Final Report. The VTRA Case B maritime risk simulation effectively replays the arrivals of vessels as they occur within this VTOSS dataset. A one year arrival stream for different vessel types was extracted from the VTOSS database which displayed no apparent data collection interruptions. This one year arrival stream was combined with regatta data, whale watching movement data and information collected for tribal and commercial fisheries as described in Technical Appendix C of the VTRA Final Report to create the VTRA Case B maritime risk simulation for the year 2005. Overall the maritime risk simulation simulates the movement of 26 different vessel types across the VTRA study area.

The number of calls at the CHPT dock for VTRA Case B was evaluated in response to a request for these numbers received two days before the February 3rd, 2009 meeting. It was evaluated in the VTRA Case B risk simulation at 268 and not 261 as indicated by the table above. A current range of operations estimates for the year 2005 was provided by BP and listed 290 – 340 calls per year (Table AD-12 in the VTRA Final Report – Addendum). Updated current range of operations estimates for the years 2006 - 2025 were provided by BP and listed 320 – 400 calls per year (Table AD-13 in the VTRA Final Report – Addendum). The table above cites the latter range for VTRA Case B, not the range 290 – 340 calls per year.

Observe that the number of calls of 268 counted by the VTRA Case B traffic risk simulation using a replay of the VTOSS database arrivals, falls outside the 290 – 340 calls per year provided by BP for 2005. Of the 268 calls generated by the VTRA Case B maritime simulation 143 calls were crude tankers. The presentation that was provided following the February 3rd, 2009 meeting separated calls into crude and product categories. The simulation generated 143 crude tanker calls in VTRA Case B which coincides with the number of calls of crude vessels provided by BP for 2005. Hence, there appears to be an inconsistency between the VTOSS data and the range information provided by BP that is rooted in the BPCHPT product vessel category. While we have no direct explanation for this inconsistency, one could raise the following questions: (1) Is it possible that some movements of BPCHPT product vessels were not recorded in the VTOSS database either due to a database recording issue or due to problems at the transmission end of the vessels? (2) Is it possible that BP counts multiple calls at the dock during a single visit of a BPCHPT product vessel to the CHPT dock area and vicinity?

While it was acknowledged in the VTRA Final Report – Technical Appendix C, Section C-1, that the VTOSS data is not perfect and regardless of the answers to the above questions, it is important to recognize here that the VTOSS database was the only data source available to us that describes the overall movements of vessels throughout the entire VTRA Study area. Since we were tasked to conduct a vessel traffic risk study with a maritime transportation system focus we have had to rely on this VTOSS database for the modeling of these vessel movements. The VTRA Case B maritime simulation effectively replays the arrivals of vessels and movements as they occur within this VTOSS dataset (see VTRA Final Report – Technical Appendix C, Section C-1). Even though call data from BP about the CHPT dock provides information about how often a BPCHPT vessel visits this dock, this call data does not describe the movements of those vessels throughout the VTRA maritime transportation system. For example, prior or following a call of a BPCHPT vessel to the CHPT dock, it may also serve other refineries during their visit to VTRA Study area and it may have to travel to the various anchorages distributed throughout the VTRA Study area. It is also worthwhile to note here that the ranges of operations provided by BP display high levels of uncertainty within each estimate. Indeed, observe that the initial current range of operations provided by BP for 2005 only overlaps the updated ranges of operations by 20 calls whereas they provided a total range of 50 calls for 2005 and 80 calls for 2006-2025. Summarizing, the task of modeling the movements of vessels throughout the VTRA study area required us to rely primarily on the VTOSS database, which was the best available data source for VTRA system wide traffic data at that time.

VTRA Case C replays the arrivals of VTRA Case B with the additional assumption that only a single terminal is available. A comparison of vessel traffic accident risk between VTRA Case B and VTRA Case C is primarily based on (1) the movement of vessels as observed within the VTOSS database without the need of making additional assumptions to alter the VTOSS arrival stream and (2) the incident/accident calibration process of VTRA Case B against observed historical BPCHPT incident/accident data. The VTRA Case B maritime traffic simulation generates and distributes BPCHPT vessel accident scenarios across the VTRA study area. The process of accident scenario generation and counting within the maritime risk simulation was discussed in more detail in Section D-4-1 of the VTRA Final Report - Technical Appendix D, pages D-43 to D-50.[1]

Calibration of these generated scenarios against collected incident data ensures that the VTRA Case B risk simulation generates on average the same annual frequency of incidents as has been observed historically (see VTRA Final Report - Technical Appendix A for detail about BPCHPT vessel incident data collection). Incidents in the VTRA study are mechanical

[1] The terminology used in VTRA Final Report - Technical Appendix D for accident scenarios are collision, drift, power and allision interactions.

failures and human errors. Incident calibration of the maritime risk simulation was conducted separately for the two calibration classes (1) BPCHPT tankers and (2) BPCHPT ATB's and ITB's. BPCHPT tankers primarily transport crude oil and some product oil; BPCHPT ATB's and ITB's primarily transport refined products. Within a calibration class, the effect of the incident calibration is the even distribution of average annual incident frequency across generated simulations scenarios within that class. The process of incident calibration of the VTRA Case B maritime risk simulation was discussed in more detail in Section D-4-2 of the VTRA Final Report - Technical Appendix D, pages D-49 to D-50.

A subsequent VTRA Case B accident calibration process for the combined class of BPCHPT vessels ensured that the maritime risk simulation generates on average the same annual frequency of accidents as has been observed historically (see VTRA Final Report - Technical Appendix A for detail on BPCHPT vessel accident data collection). Accident frequency calibration was conducted separately for the accident types: collisions, groundings and allisions. The distributions of annual accident frequency across the VTRA Case B generated simulation scenarios is a function of (1) the incident calibration process and (2) the probability of an accident given an incident per scenario. The probability of an accident given an incident per scenario depends on many factors. A detailed expert judgment elicitation was conducted for their estimation and was discussed in VTRA Final Report – Technical Appendix D. The process of accident calibration of the VTRA Case B maritime risk simulation was discussed in more detail in Section D-4-3 of the VTRA Final Report - Technical Appendix D, pages D-50 to D-60.

For the construction of VTRA Case A and the low, medium and high future traffic risk cases, the VTRA Case B (i.e. VTOSS database) arrival patterns had to be modified. This required a methodology of altering the arrival patterns of many vessel traffic types, of which the BPCHPT vessels are only one. We have consistently focused on the common metric of transit counts across vessel types throughout the VTRA study, since we were tasked to conduct a vessel traffic risk study with a maritime transportation system focus. A transit in the simulation is any movement from a point A to a point B within the simulation study area. This definition is similar to the definition of a transit used and recorded by the USCG VTS. Simulation transit counts were generated for all the different vessel types in the maritime risk simulation. It is important to recognize here that transit counts by vessel type (and call counts of BPCHPT vessels) are an output of the maritime risk simulation, not an input.

To arrive at targeted percentage traffic increases or decreases by vessel type from VTRA Case B for VTRA Case A and the low, medium and high traffic scenarios, a variety of data sources were used. The VTRA team conducted a time series analysis on annual data on visits purchased from the Marine Exchange and on transit data provided by the USCG. In addition data was provided by BP in terms of potential future call numbers at the CHPT dock. Hence, traffic data was provided in terms of three different metrics: transits, visits and calls. Regardless of the dimension of each metric, these data sources allow for the evaluation of percentage increases from the year 2005. This was explained in VTRA Final Report – Technical Appendix F. Additional explanation was provided in VTRA Final Report – Addendum, during the February 3rd, 2009 meeting and in a separate presentation that was provided submitted February 23rd, 2009. Next, these targeted percentage increases and decreases were used to check if similar percentage increases were reasonably achieved across vessel types in terms of transit counts in VTRA Case A and the low, medium and high traffic scenarios by modifying the arrival stream of VTRA Case B. Since transit counts by vessel type in the VTRA risk simulation are an output and not an input, a manual iterative process had to be used. The VTRA Case A and the low, medium and high traffic risk simulation scenarios were developed by altering the observed number of annual simulation transits for vessel types in the same manner across vessel types. The VTOSS database and our maritime transportation system risk simulation deal with a finite population of vessels that come and leave the simulation study area. Our mechanism to increase the total number of transits per year in the simulation for VTRA Case A and the low, medium and high traffic scenarios is to alter the amount of time that vessels spend outside of the system simulation study area as observed in the VTOSS data.

Returning to the question raised above, VTRA Case B was calibrated using historically collected BPCHP incident and accident data and that transit counts increases in VTRA Cases D, F and H were checked against targeted percentage transit count increases from VTRA Case B. The targeted percentage increases across vessel types were derived from a variety of data sources The primary reason that the call counts for VTRA Cases D, F and H do not fall within the forecasted ranges provided by BP is that the call count for VTRA Case B of 268 (not 261 as presented in the table above) did not fall in the estimate range provided for 2005 (which does not equal the range 320 – 400 in the table above but equals to lower range from 290 – 340 provided for 2005).

Under the assumption that the maritime transportation system as implemented in the VTRA Case B maritime risk simulation is able to “handle” a change in traffic in VTRA Cases D, F and H in a similar manner, the ratio of transits to calls would remain constant. We evaluated from the marine exchange data and USCG data a ratio of approximately 3 transits per visit across various different vessel types. Our VTRA maritime traffic risk simulation demonstrated ratios ranging from 2.9 for VTRA Case B to 4.0 for VTRA Case I for BPCHPT vessels. These ratios were provided in the presentation that was submitted on February 23rd, 2009, after the February 3rd, 2009 meeting. The change in the ratio of transits per call for VTRA Cases D, F and H is an indication that the maritime transportation system does not “handle” these vessel arrival changes in a similar manner as in VTRA Case B. This was further supported by evaluating anchorage time multiplication factors also included in this presentation provided. Neither the transits per call ratios nor the anchorage time multiplication factors were requested, but were provided to enhance understanding of VTRA Case analysis results as an additional professional courtesy after the February 3rd, 2009 meeting. Hence, the secondary reason that the call counts for VTRA Cases D, F and H do not fall within the forecasted ranges provided by BP is that the ratio of transits per call increased from VTRA Case B.

Summarizing, the VTRA maritime transportation system risk simulation was built using the best available data to reflect system wide traffic and the distribution of average accident frequency and average oil outflow volumes associated with generated accident scenarios involving BPCHPT vessels across the VTRA Study area. It is important to emphasize here that from a risk assessment perspective, the process of calibration of VTRA Case B as explained above in a nutshell (and in more detail in the VTRA Final Report – Technical Appendix D, Section D-4) (1) absorbs and (2) mitigates against the effect your question raised could otherwise potentially have on the VTRA Case B accident frequency analysis results and VTRA Case B oil outflow analysis results, respectively. Finally as a result of the comprehensive analysis that was conducted combined with the calibration to historical incident and accident, the paired comparison of accident frequency and oil outflow analysis results of VTRA Case B and VTRA Case C, respectively, have demonstrated robustness over the course of the analysis process leading to the VTRA Final analysis results. The same applies to the paired comparisons of the low traffic scenarios (VTRA Case D and E), the medium traffic scenarios (VTRA Case F and G), and the high traffic scenarios (VTRA Case H and I).

Question 2:

> ***Waiting Time -*** *Page 18 of the traffic levels presentation shows a dramatic increase in waiting time in Case I when compared to Case B. What is the actual time increase? Does this contribute to the increase in transits and risk for Case I?*

Response:

Since we were tasked to conduct a vessel traffic risk study with a maritime transportation system focus, we evaluated the cumulative waiting time over one year for all tankers (not just BPCHPT vessels) in VTRA Case B over all anchorage areas. We have for the cumulative annual waiting time for all tankers in VTRA Case B about 107.5 days. We have for the cumulative annual waiting time for all tankers in VTRA Case I about 615.6 days. This yields a multiplication factor of 5.73 as reported in the presentation that was provided as a professional courtesy after the February 3rd, 2009 meeting. We only evaluate vessel traffic risks for BPCHPT vessels that are underway. Hence, the increase in time of tankers spent at anchorages does not contribute to the risk evaluations for VTRA Case I. However, the increased numbers of transits to and from anchorages do contribute to the risk evaluations for VTRA Case I.

Question 3:

> ***Case A, D and F Revised Transits –*** *The number of transits associated with Cases A, D and F shown in the handout from the 2-3-2009 meeting has been revised in the traffic levels presentation (see page 16). Will these changes in transit counts affect the resulting Average Accident Potential and Expected Oil Outflow results in any way? Will they change any other results or the discussion reported in the Main Report?*

Response:

The agenda for the February 3rd, 2009 meeting was provided two business days ahead of the meeting despite repeated requests for this agenda by the VTRA Team beginning with when the meeting was set-up. The agenda requested call counts for VTRA Case A-O. As was indicated during the February 3rd, 2009 meeting the VTRA maritime risk simulation was not setup to provide call counts. We used a file for that meeting that contained transit counts for VTRA Case A-I that was generated over the course of the VTRA project which ended 8/31/08. As was described in the presentation that was provided following the February 3rd, 2009 meeting, we reran all the VTRA Case A-O to make sure that the transit counts provided in that presentation are consistent with the final VTRA cases described in the VTRA Final Report. A feature was added at this time as a professional courtesy to also generate the requested call counts. Hence, the answers to both questions above are: no.

Question 4:

Vessels Not Served - *Does the difference in calls reported for each of the pairs of cases listed (see page 19) below represent the number of vessels not served in the one year simulation period? If so why are some vessels not served in Case E which has a lower number of calls than Case A?*

a. *Case B – C,* *(2005 with/without North Wing in operation)*
b. *Case D – E,* *(2005 Low – with/without North Wing in operation)*
c. *Case F – G,* *(2005 Medium – with/without North Wing in operation)*
d. *Case H – I,* *(2005 High – with/without North Wing in operation)*

Response:

Any BPCHPT vessel that arrives to the VTRA Study area in the maritime traffic risk simulation gets served by the CHPT dock, eventually. VTRA Case B replays the VTOSS traffic arrivals in the VTOSS database. This database deals with a finite population of vessels. Hence, our maritime transportation system simulation also deals with a finite population of vessels that come and leave the VTRA simulation study area. Our mechanism to alter the arrival patterns of VTRA Case B to model VTRA Case A and the low, medium and high traffic scenarios, is to alter the amount of time that vessels spend outside of the VTRA study area as observed in the VTOSS data base. This was explained in the VTRA Final Report – Addendum and we discussed this during the February 3rd, 2009 meeting.

The structural difference in the paired VTRA Case comparisons above is that in VTRA Cases B, D, F and H two terminals are operational and in VTRA Cases C, E, G and I one terminal is operational. As a result, in VTRA Cases C, E, G and I, BPCHPT vessels spent on average more time at anchorages waiting for the single occupied terminal to become available. The effect of this difference between the single server and two server systems is that the inter-departure times between vessels leaving the VTRA study area (after being served) increase on average in the case of the single server system. Hence, the throughput of the maritime simulation (i.e. number of tankers that pass through the system per unit time) decreases when going from the two server system to the single server system. This in-turn is reflected in the reduction of the number of calls per year to the CHPT dock when going from the two server systems to the single server systems. While call numbers were not available during the February 3rd, 2009 meeting, this mechanism was explained during this meeting.

Summarizing, the difference in the number of calls when going from the single server to the two serves systems follows from an overall change in maritime transportation system behavior. While some vessels may still be at anchorages at the end of the simulation year waiting to be served, this number of vessels still waiting at the end of the simulation year is not the same as the difference in call numbers between for example VTRA Case B and VTRA Case C. At the conclusion of a simulation year, vessels may be elsewhere within the VTRA study area or outside the study area.

The explanation above, however, does not explain the difference between VTRA Case A and E, since these cases both deal with the single server system. VTRA Case A represents the VTRA year 2000 simulation scenario, whereas VTRA Case E represents the 2025 low traffic scenario. Hence, the difference between VTRA Case A and E results from the different arrival patterns for VTRA Case A and VTRA Case E. Both transit and call counts in VTRA Case E are lower than those in VTRA Case A due to a reduced traffic load to the VTRA study area in case of VTRA Case E.

Question 5:

> ***Transit Legs Included in Incident/Accident Counts -*** *When counting incidents involving Cherry Point vessels, are all transit legs by Cherry Point vessels within the VTRA study area considered or only those ending or starting at Cherry Point. As an example: for an individual vessel trip through the study area that only includes 2 transits, each originating or terminating at Cherry Point, it is assumed that incidents that occurred on either transit would be counted. However, in a 3 or more transit trip where the additional transits do not originate or terminate at Cherry Point, were the incidents/accidents that occurred on the additional transit legs considered?*

Response:

If a vessel docks at the CHPT dock during its visit to the VTRA study area, they are considered a BPCHPT vessel. This was defined during various meetings over the course of the two-year VTRA project, at various locations in the VTRA Final Report (for example, the Executive Summary and Technical Appendix E, page E-11) and the introduction of the VTRA Final Report – Addendum, page AD-9). Hence, potential accident and oil outflow risks are evaluated for BPCHPT vessels on their journeys throughout the VTRA study areas from their arrival to and their departure from the VTRA study area (while they are underway).

Question 6:

> ***Calculation of Calls vs. Transits*** - *The number of transits seems to increase disproportional to increased calls. For example, Comparing Case B to Case H, calls increase by 24% (269 – 332) but transits increase 49% (765 – 1138). What is the explanation for this relationship?*

Response:

As was explained in the presentation that was provided after the February 3rd, 2009 meeting, the average number of transits per call for BPCHPT vessels in VTRA Case B is 2.9. The average number of transits per call evaluated for VTRA Case H is 3.4. On Page 57 in the main report of the VTRA Final Report it was explained that the number of trips to anchorages from VTRA Case B to VTRA Case C increase. This was explained on page AD-26 of the VTRA Final Report – Addendum. In addition, during the February 3rd, 2009 meeting one of the reasons for observed increases in risk that was discussed when increasing traffic across VTRA Cases, was an increased number of transits to and from the various anchorage areas. Summarizing, the same phenomenon causes a higher number of transits per call in VTRA Case H as compared to either VTRA Case B or VTRA Case C for that matter.

Question 7:

> ***Calculation of Expected Oil Outflow Statistic -*** *The VTRA report notes that the total expected oil outflow for Case B is 141 cubic meters. Is this volume related to a specific incident or is it the sum of all expected oil outflows from all accidents that occurred during the simulation year (similar to the Annual Average Risk which we understand is a sum of the risk in all individual grid cells)? Does the VTRA simulation produce any results that identify the average expected size of spill?*

Response:
Since the VTRA oil outflow analysis result from a maritime risk simulation methodology that draws from the fields of simulation, statistical and risk analysis, an appreciation of these fields is needed when using the VTRA oil outflow analysis results as inputs to a fates and effect analysis. To that end, we have repeatedly explained the VTRA Oil outflow analysis results and how they have been evaluated, e.g. in the VTRA Final - Main Report, VTRA Final Report - Technical Appendix E, the VTRA Final Report - Addendum, during the February 3, 2009 meeting, communications prior to August 31, 2008 with ENTRIX related to the content of the VTRA interface files and communications with ENTRIX over the course of the two years of the VTRA project. Having provided VTRA oil outflow analysis results in a mutually agreed upon format and having discussed in broad terms on multiple occasions a methodology on how to use them, we are surprised at this question. In this regard, it might be helpful to point out the recently published work by McCay et al. (2008) that was conducted for the State of Washington, Joint Legislative Audit and Review Committee.

For a detailed explanation of the content of the VTRA interface files see Section "AD-4-1: Response to Comment 1", Page AD-30 in the VTRA Final Report - Addendum. This section also refers to Microsoft Excel files that were provided that explain how we arrive at the total annual average outflow per accident type. We evaluated on average for VTRA Case B, 47.0, 87.3, 5.5, and 1.2 cubic meters per year for collisions, power groundings, drift grounding and allisions, respectively. These average annual volumes by accident type total 141.0 cubic meters, as demonstrated by Figure 33 in the VTRA Main Report and Figure AD-1 in the VTRA Final Report Addendum. We have further separated the oil outflow results into the categories of persistent and non-persistent oil outflow as per the specific request by the CORPS and ENTRIX in face to face communications with them during a meeting dating back to May 13th, 2008. How could the average annual total oil outflow of 141.04 cubic meters for VTRA Case B have arisen from a single incident if this total arises from four different accident types?

To provide once more an explanation; our maritime risk simulation approach generates thousands of accident scenarios. For each accident scenario we evaluate the accident probability using a combination of expert judgment and accident/incident data analysis techniques. For each accident scenario we evaluate the average oil outflow using a separate oil outflow model. This is an average oil outflow per accident scenario since we evaluate the oil outflow volume for 100 different impact locations across the length or width of a vessel as explained in VTRA Final Report - Technical Appendix E on page E-16 for that scenario. For example, the impact location of a collision in part determines what tank compartments could be penetrated which in turn is a factor in the oil outflow volume given the collision impact at that location.

The maritime risk simulation generates accident scenarios over the course of a one year simulation for the various VTRA Cases. The frequency of occurrence of accident scenarios, their accident probabilities and their average oil outflow are all integrated, resulting in the average annual oil outflow of 141.0 cubic meters for VTRA Case B. This number may be considered relatively small compared to the potential oil outflow in a worst case accident scenario, since thankfully the probability of an accident per scenario is small. Risk analysis typically deals with high consequence low probability events.

Since the accident scenarios that are generated by the maritime risk simulation differ by their geographic location we have provided ENTRIX comma separated VTRA interface files for the purpose of their fates and effect analysis. The VTRA interface files provided to ENTRIX contain grid cell by grid cell:

1. the average accident frequency per year per grid cell.
2. the average oil outflow volume per accident per grid cell.

These averages above are evaluated by averaging over all accident scenarios that occurred in a grid cell over the course of a one year of traffic risk simulation. Each grid cell covers an area of about 0.5 nautical miles by 0.5 nautical miles.

This analysis procedure was explained in the VTRA Final Report Addendum, the VTRA Final Report, as well in communications prior to 8/31/08 by means of conference calls, e-mail communications, regular held meetings over the course of this two year project and additional Microsoft EXCEL files provided to ENTRIX on 7/16/08 explaining the content of the VTRA interface files.

Reference:

DBF McCay, CJ Beegle-Krause, J Rowe, D. Schmidt Etkin, C. Moore and K. Mitchel (2008). *Final Report, Oil Spill Risk Analysis Review*, ASA 2008-099, Submitted to:
State of Washington, Joint Legislative Audit and Review Committee, November 3, 2008.