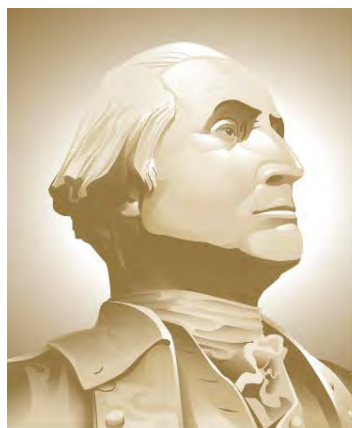


# VTRA 2010 POTENTIAL COLLISION OIL FUEL AND CARGO LOSSES BY ALL FV, CARGO – FV, TANK- FV AND WHAT-IF FV

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**CASE T: Gateway, Kinder Morgan, Delta Port**

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PRELIMINARY

# Table. Focus Vessel (FV) Classification for the 26 VTOSS vessel type classification used in the GW/VCU MTS simulation model.

- NON – FV** : Those vessels that Interacting Vessels (IV) with Focus Vessels (FV)
- BASE CASE CARGO – FV** : Bulk Carriers, Container Vessels, Other Cargo Vessels that travel in VTRA 2010 Base Case
- BASE CASE TANK – FV** : Oil Barge, Oil Tankers, Chemical Carrier, ATB 's that travel in VTRA 2010 Base Case
- WHAT IF – FV** : CARGO AND TANK FV'S added to VTRA 2010 Base Case to model What-If Scenario

**Note:** Focus Vessels (FV's) are also considered as Interacting Vessels (IV's) when interacting with another Focus Vessel.

#	VESSEL TYPE	FOCUS VESSEL?	#	VESSEL TYPE	FOCUS VESSEL?
1	BULKCARRIER	CARGO - FV	14	PASSENGERSHIP	NO
2	CHEMICALCARRIER	TANK - FV	15	REFRIGERATEDCARGO	CARGO-FV
3	CONTAINERSHIP	CARGO - FV	16	RESEARCHSHIP	NO
4	DECKSHIPCARGO	CARGO - FV	17	ROROCARGOSHIP	CARGO-FV
5	FERRY	NO	18	ROROCARGOCONTSHIP	CARGO-FV
6	FERRYNONLOCAL	NO	19	SUPPLYOFFSHORE	NO
7	FISHINGFACTORY	NO	20	TUGTOWBARGE	NO
8	FISHINGVESSEL	NO	21	UNKNOWN	NO
9	LIQGASCARRIER	TANK - FV	22	USCOASTGUARD	NO
10	NAVYVESSEL	NO	23	VEHICLECARRIER	CARGO-FV
11	OILTANKER	TANK - FV	24	YACHT	NO
12	OTHERSPECIALCARGO	CARGO - FV	25	ATB	TANK - FV
13	OTHERSPECIFCSERV	NO	26	OIL BARGE	TANK - FV

# IMPORTANT:

THE OPERATIVE WORD IN PRESENTING THESE ANALYSIS RESULTS IS THE USE OF THE WORD

# POTENTIAL

TO INDICATE THAT THESE ANALYSIS RESULTS DO NOT FOLLOW FROM AN HISTORICAL DATA ANALYSIS, BUT THROUGH THE USE OF AN ANALYSIS TOOL THAT EVALUATES SUCH **POTENTIAL**.

THE 2010 YEAR IS CONSIDERED **THE BASE CASE YEAR** AND A BASE CASE YEAR POTENTIAL IS EVALUATED.

NEXT, **WHAT-IF SCENARIOS** ARE DEVELOPED FROM THE BASE CASE BY ADDING ADDITIONAL HYPOTHETICAL TRAFFIC AND A WHAT-IF POTENTIAL IS EVALUATED AND COMPARED **RELATIVE TO THE BASE CASE** TO INFORM **RISK MANAGEMENT**.

**CASE T: GW 487, KM 348, DP 348 and 67:**

**BASE CASE 2010 TRAFFIC WITH  
FOLLOWING WHAT-IF FOCUS VESSELS**

487 Gateway Bulk Carriers + Bunkering Barges

348 Kinder Morgan Tankers + Bunkering Barges

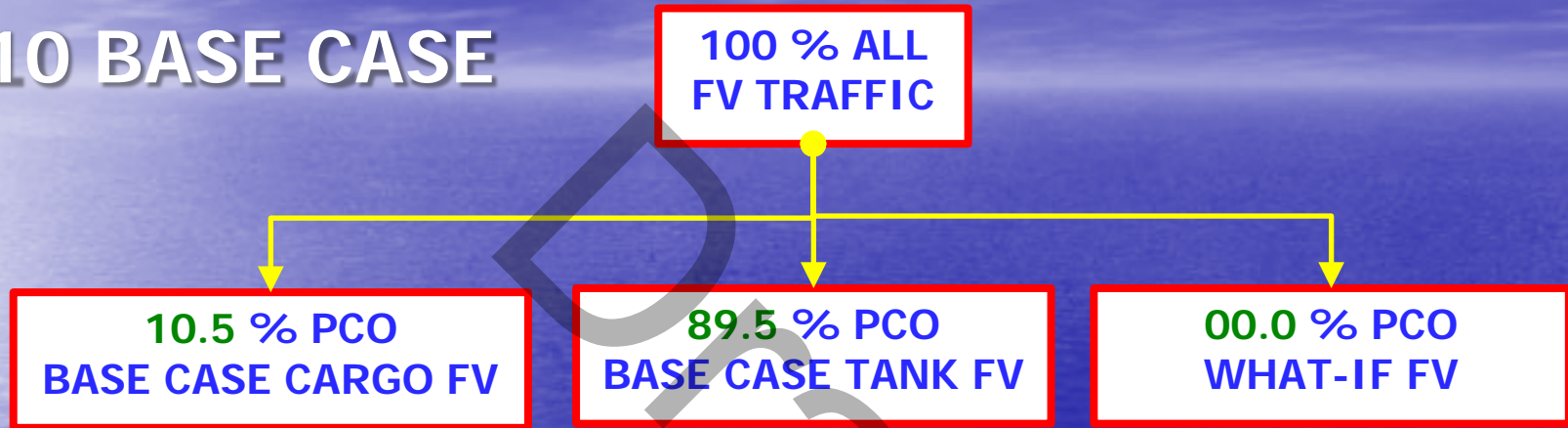
348 Delta Port Bulk Carriers + Bunkering Barges

67 Delta Port Container Ships+ Bunkering Barges

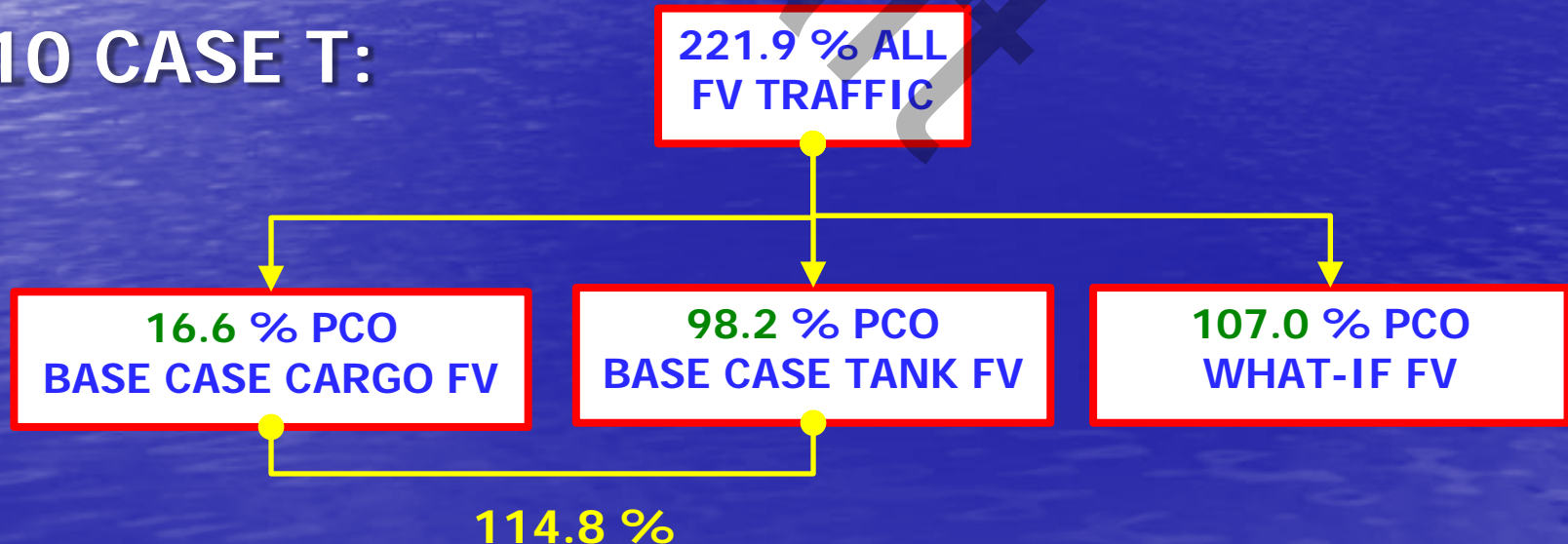
# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ANNUAL COLLISION OIL LOSS

PCO : POTENTIAL COLLISION OIL LOSS - PER YEAR

## 2010 BASE CASE

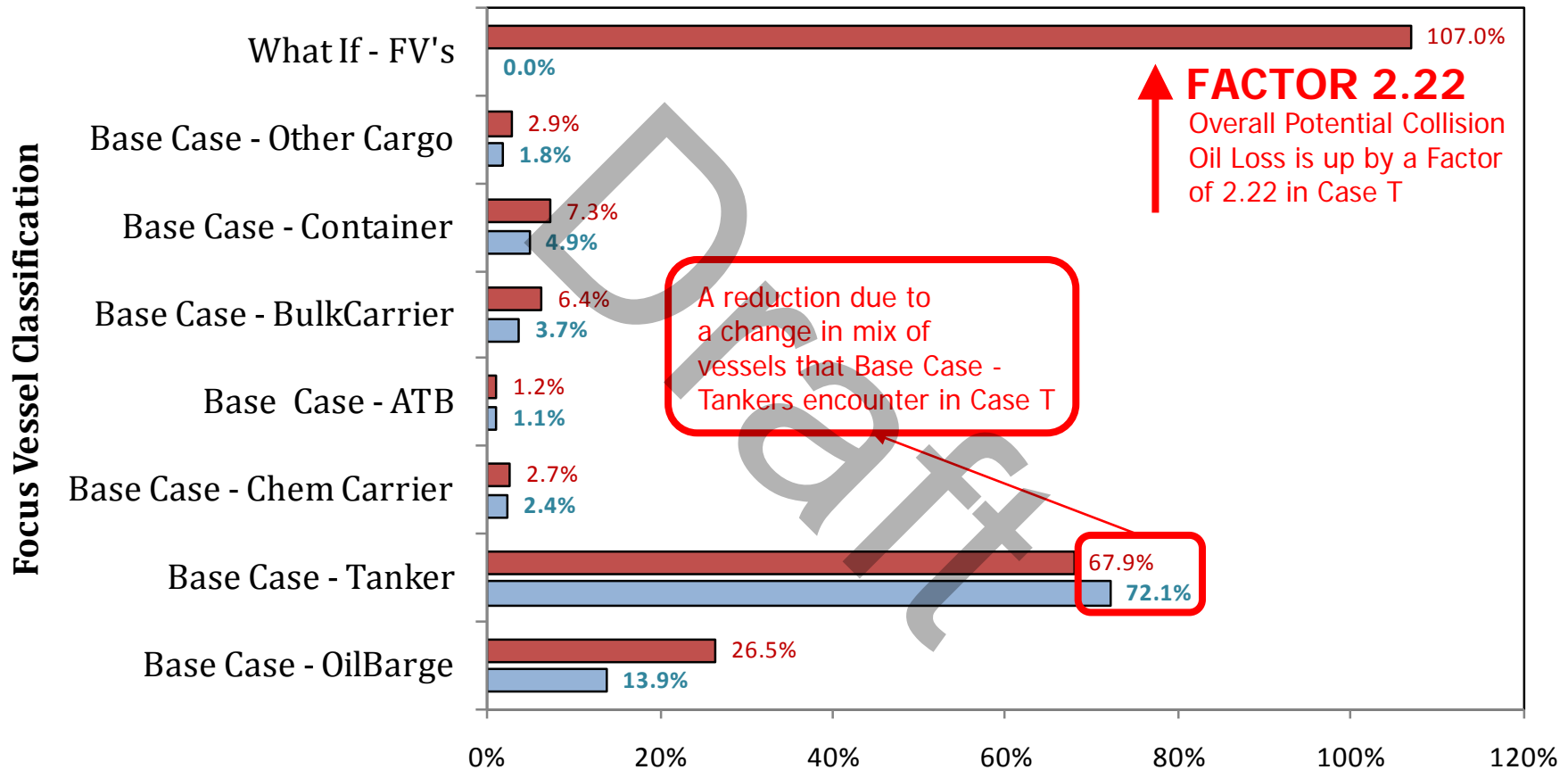


## 2010 CASE T:



# CASE T: GW 487, KM 348, DP 348 and 67:

## VTRA 2010 - COLLISION OIL LOSS (CARGO + FUEL)



**↑ FACTOR 2.22**  
Overall Potential Collision Oil Loss is up by a Factor of 2.22 in Case T

A reduction due to a change in mix of vessels that Base Case - Tankers encounter in Case T

% of 2010 Potential Collision Total Oil Outflow (PCO)

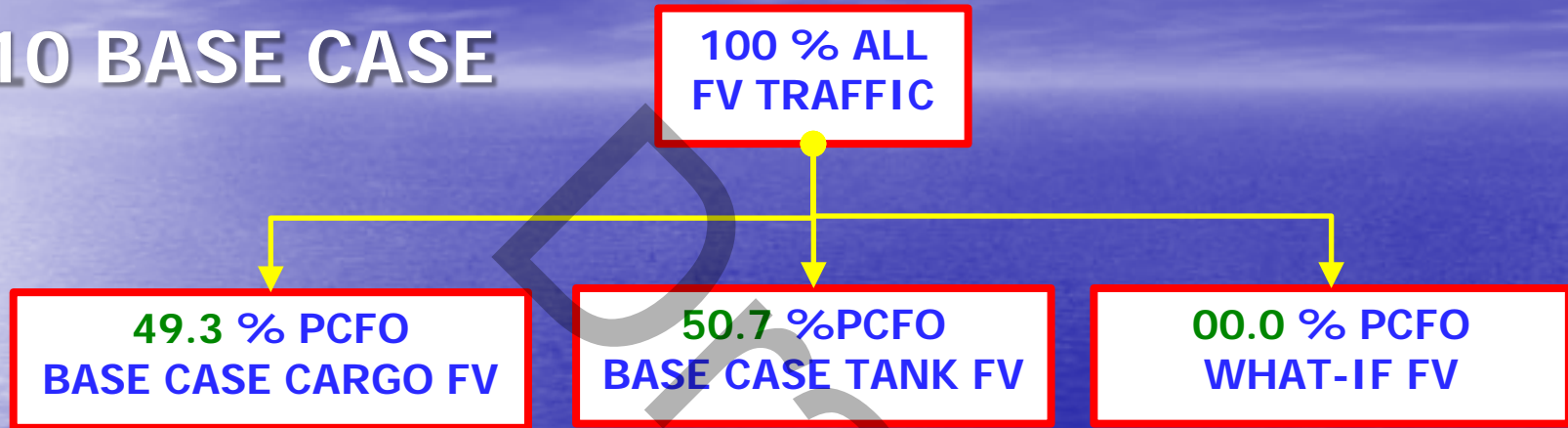
■ T: GW - KM - DP - 221.9%    ■ P: BASE CASE 2010 - 100.0%



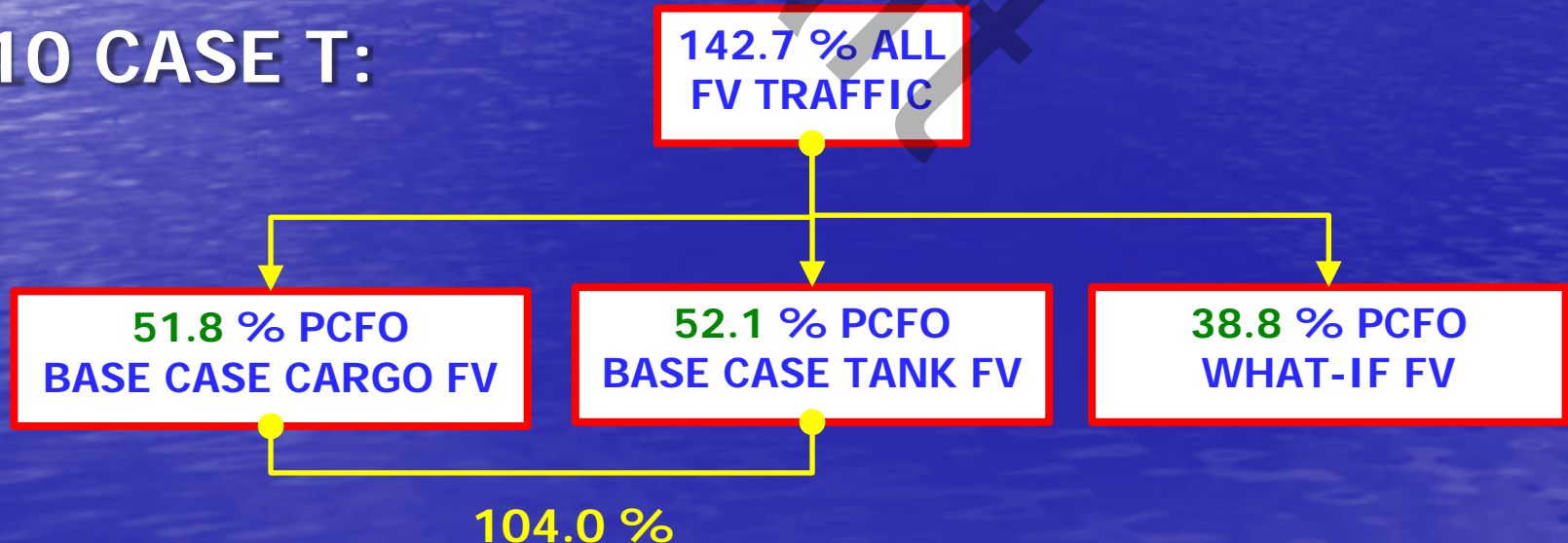
# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ANNUAL COLLISION FUEL OIL LOSS

PCFO : POTENTIAL COLLISION FUEL OIL LOSS - PER YEAR

## 2010 BASE CASE

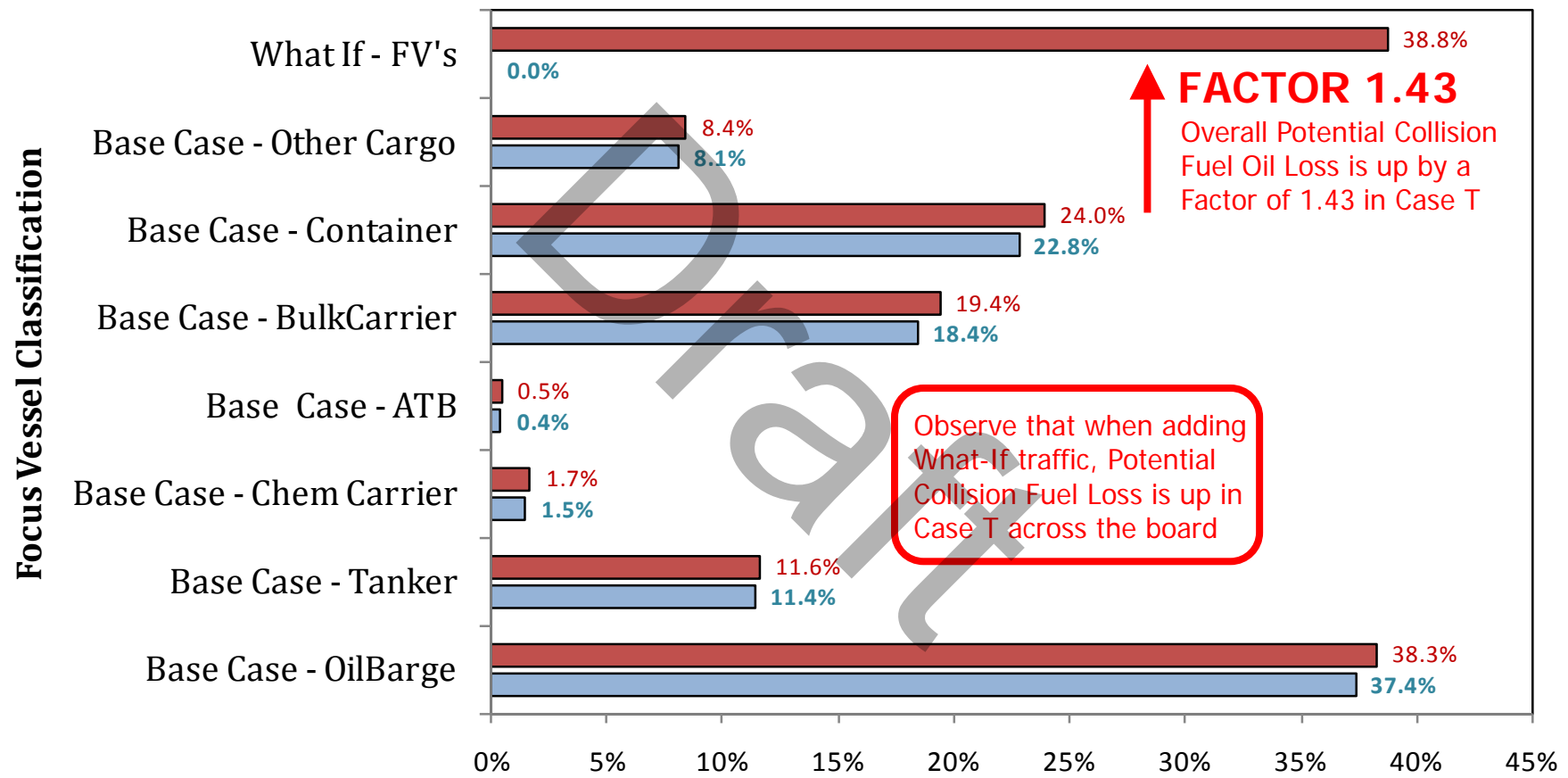


## 2010 CASE T:



# CASE T: GW 487, KM 348, DP 348 and 67:

## VTRA 2010 - COLLISION FUEL OIL LOSS



**↑ FACTOR 1.43**  
 Overall Potential Collision Fuel Oil Loss is up by a Factor of 1.43 in Case T

Observe that when adding What-If traffic, Potential Collision Fuel Loss is up in Case T across the board

% of 2010 Potential Collision Fuel Oil Outflow (PCFO)

■ T: GW - KM - DP - 142.7%    ■ P: BASE CASE 2010 - 100.0%

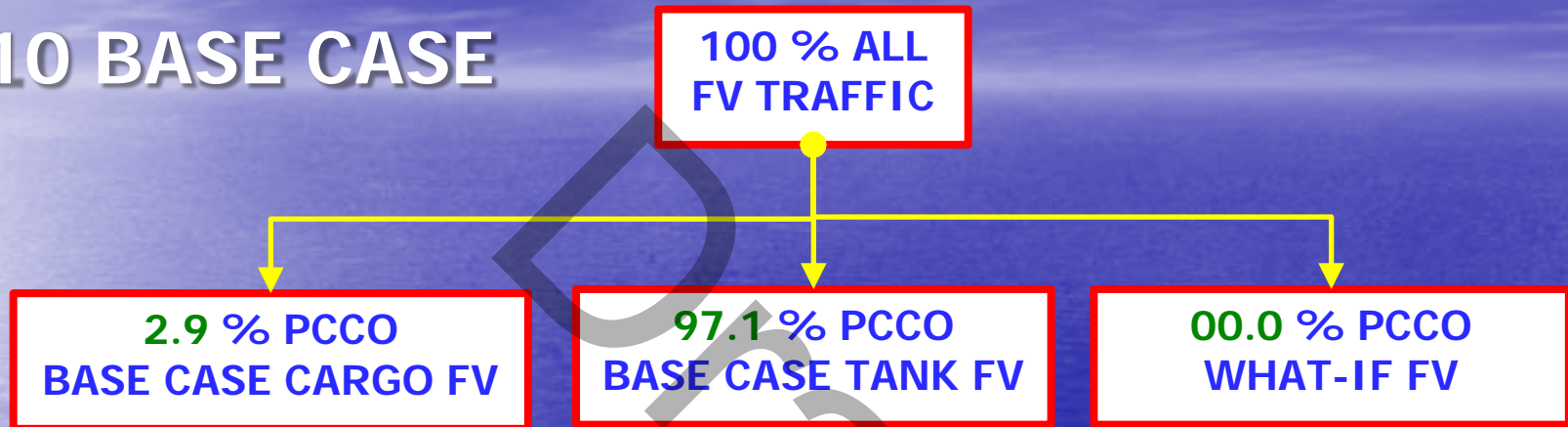




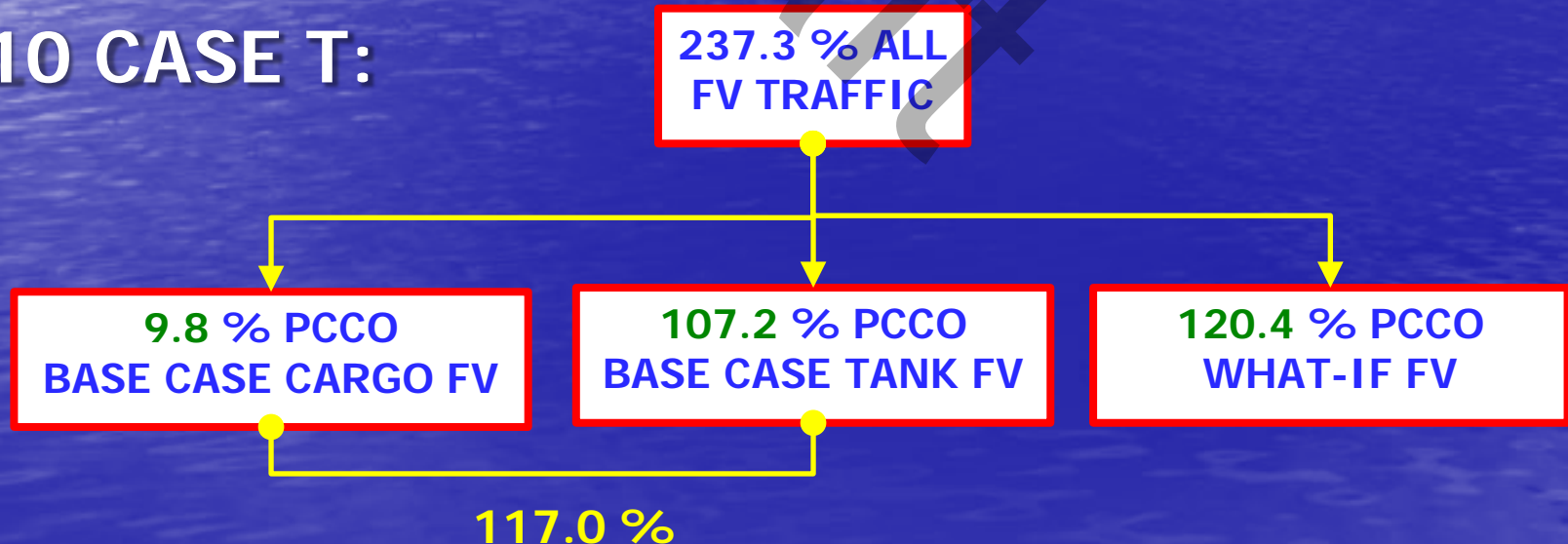
# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ANNUAL COLLISION CARGO OIL LOSS

PCCO : POTENTIAL COLLISION CARGO OIL LOSS - PER YEAR

## 2010 BASE CASE

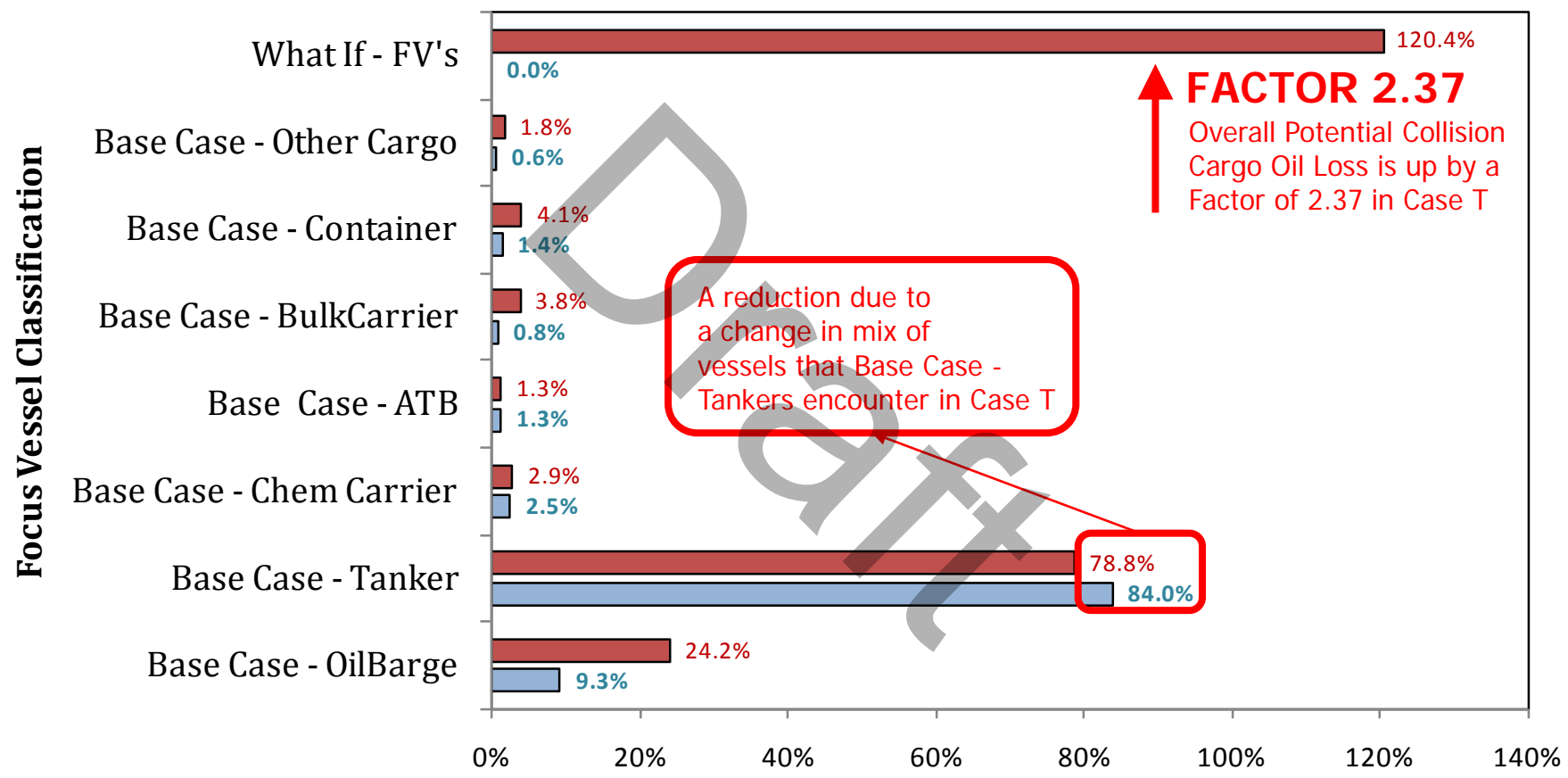


## 2010 CASE T:



# CASE T: GW 487, KM 348, DP 348 and 67:

## VTRA 2010 - COLLISION CARGO OIL LOSS



**↑ FACTOR 2.37**  
 Overall Potential Collision Cargo Oil Loss is up by a Factor of 2.37 in Case T

A reduction due to a change in mix of vessels that Base Case - Tankers encounter in Case T

78.8%  
84.0%

% of 2010 Potential Collision Cargo Oil Outflow (PCCO)

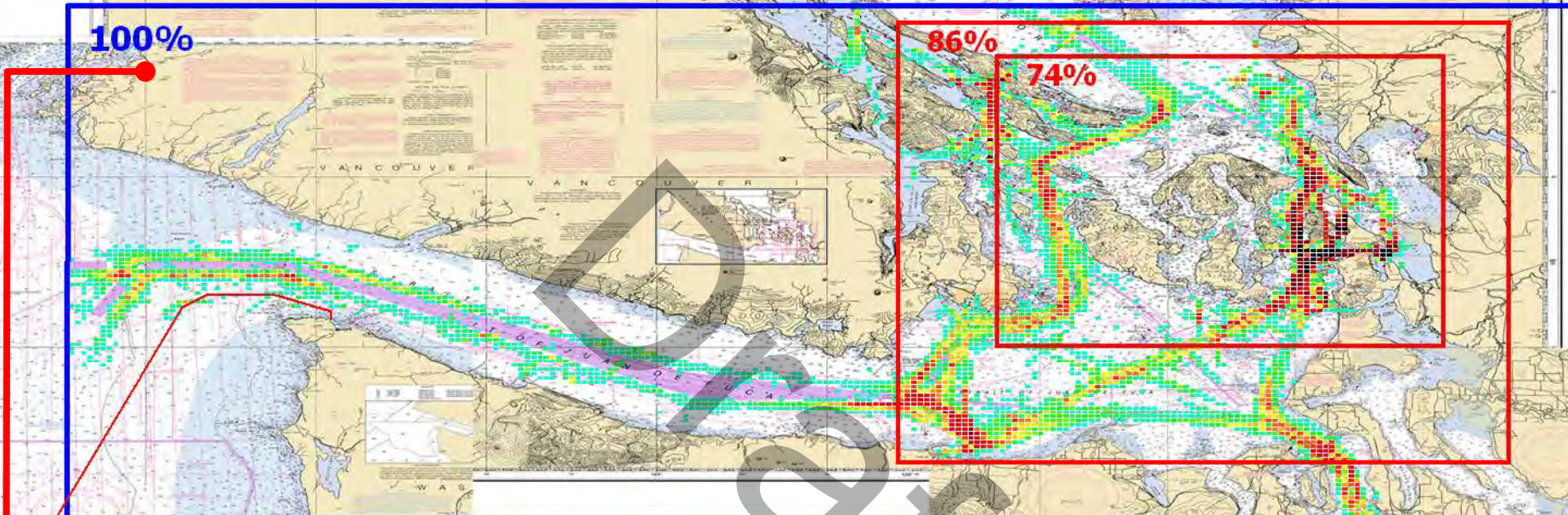
■ T: GW - KM - DP - 237.3%    ■ P: BASE CASE 2010 - 100.0%



# P: ALL FV POTENTIAL COLLISION OIL LOSS (PCO)



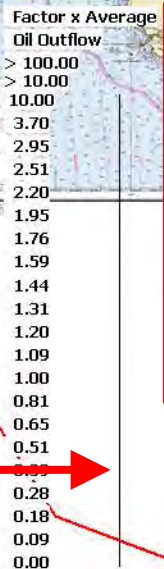
## P: VTRA 2010 - BASE CASE - All FV



100%

86%

74%



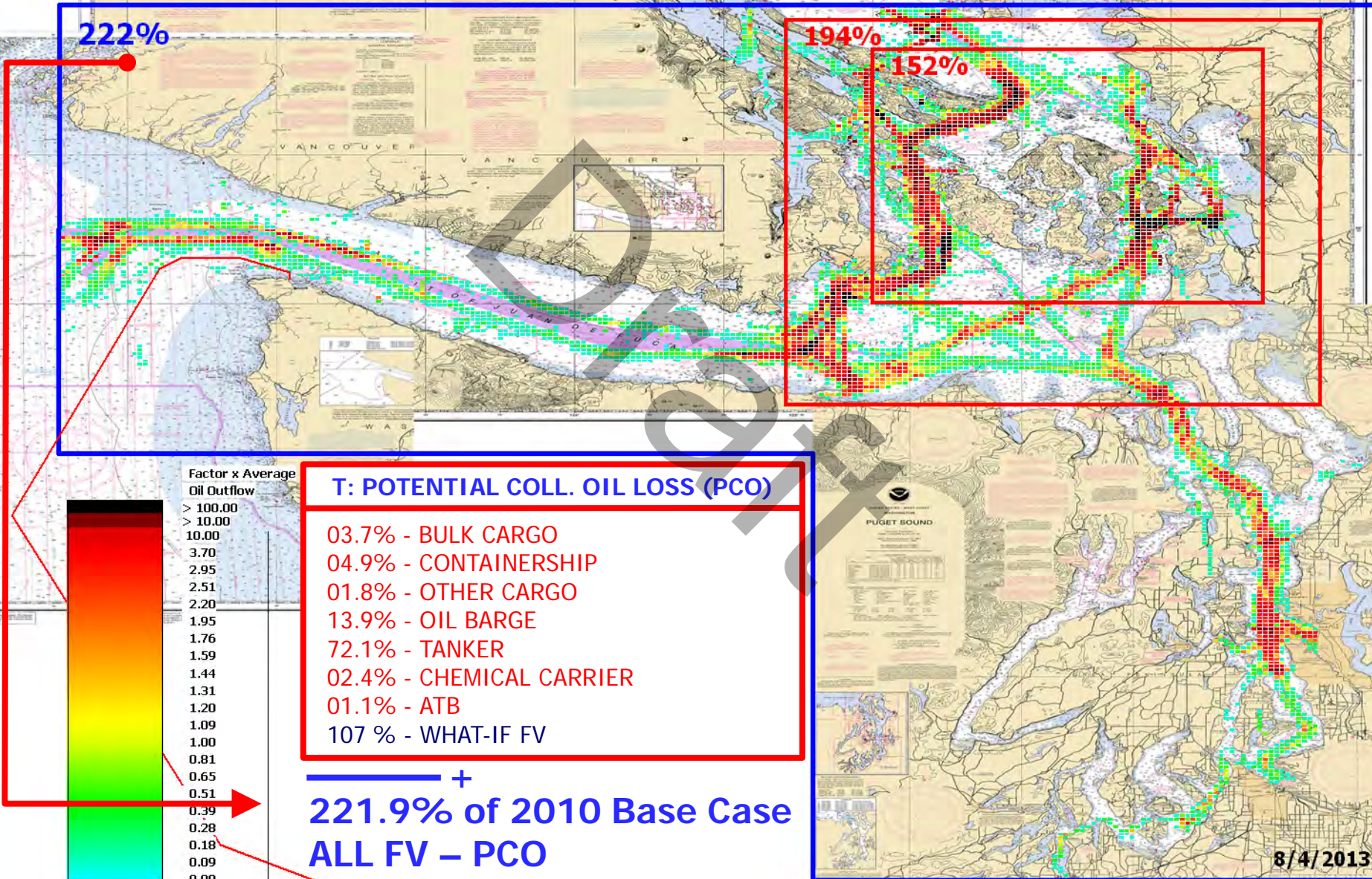
### P: POTENTIAL COLL. OIL LOSS (PCO)

- 03.7% - BULK CARGO
- 04.9% - CONTAINERSHIP
- 01.8% - OTHER CARGO
- 13.9% - OIL BARGE
- 72.1% - TANKER
- 02.4% - CHEMICAL CARRIER
- 01.1% - ATB
- 00.0% - WHAT-IF FV

+  
**100.0% of 2010 Base Case**  
**ALL FV – PCO**

# T: ALL FV POTENTIAL COLLISION OIL LOSS (PCO)

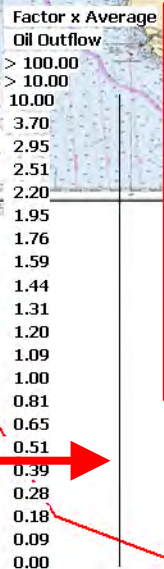
T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348 - All FV



222%

194%

152%



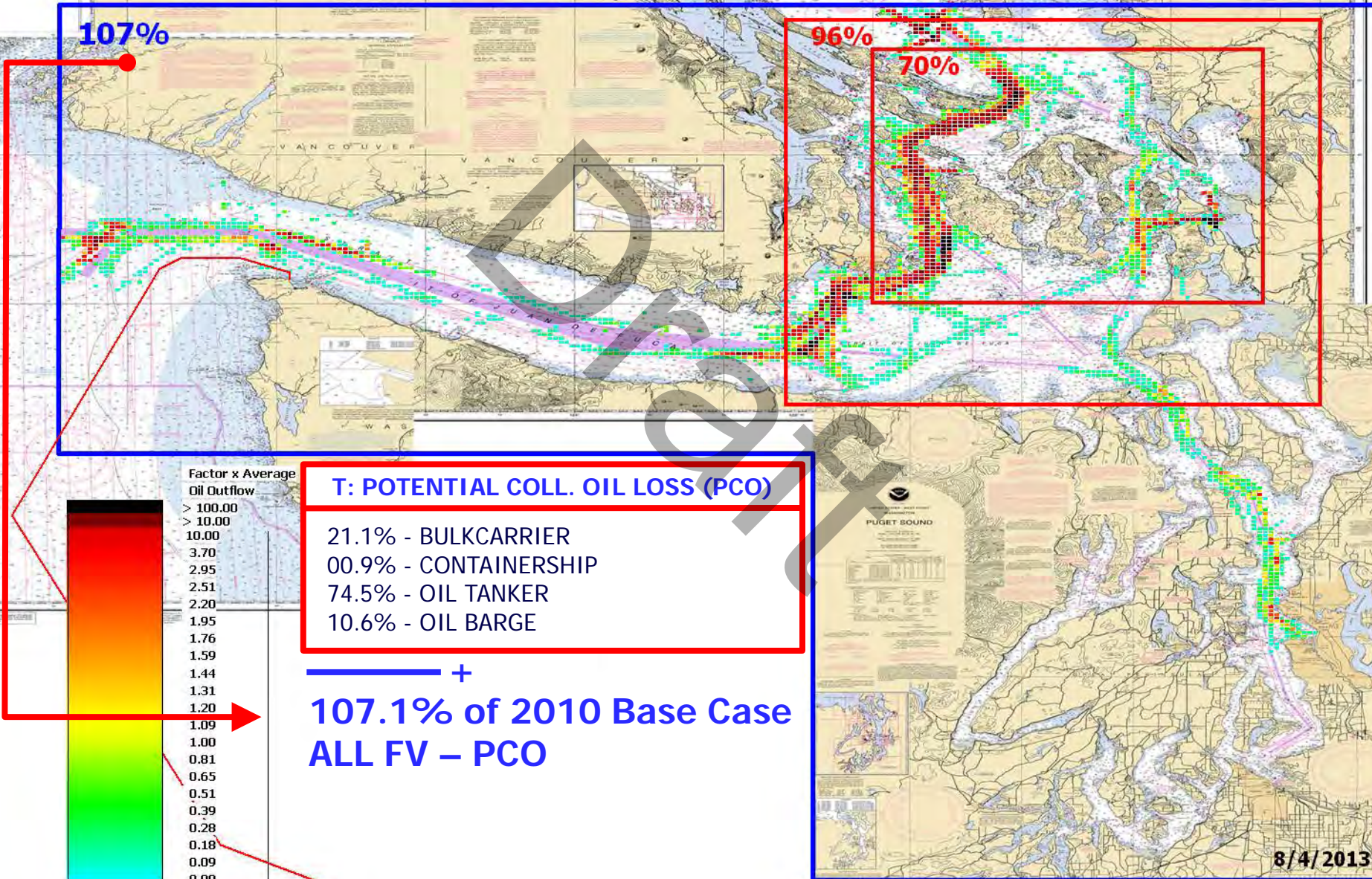
## T: POTENTIAL COLL. OIL LOSS (PCO)

- 03.7% - BULK CARGO
- 04.9% - CONTAINERSHIP
- 01.8% - OTHER CARGO
- 13.9% - OIL BARGE
- 72.1% - TANKER
- 02.4% - CHEMICAL CARRIER
- 01.1% - ATB
- 107% - WHAT-IF FV

+  
221.9% of 2010 Base Case  
ALL FV – PCO

# T: WHAT-IF FV POTENTIAL COLLISION OIL (PCO)

T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348



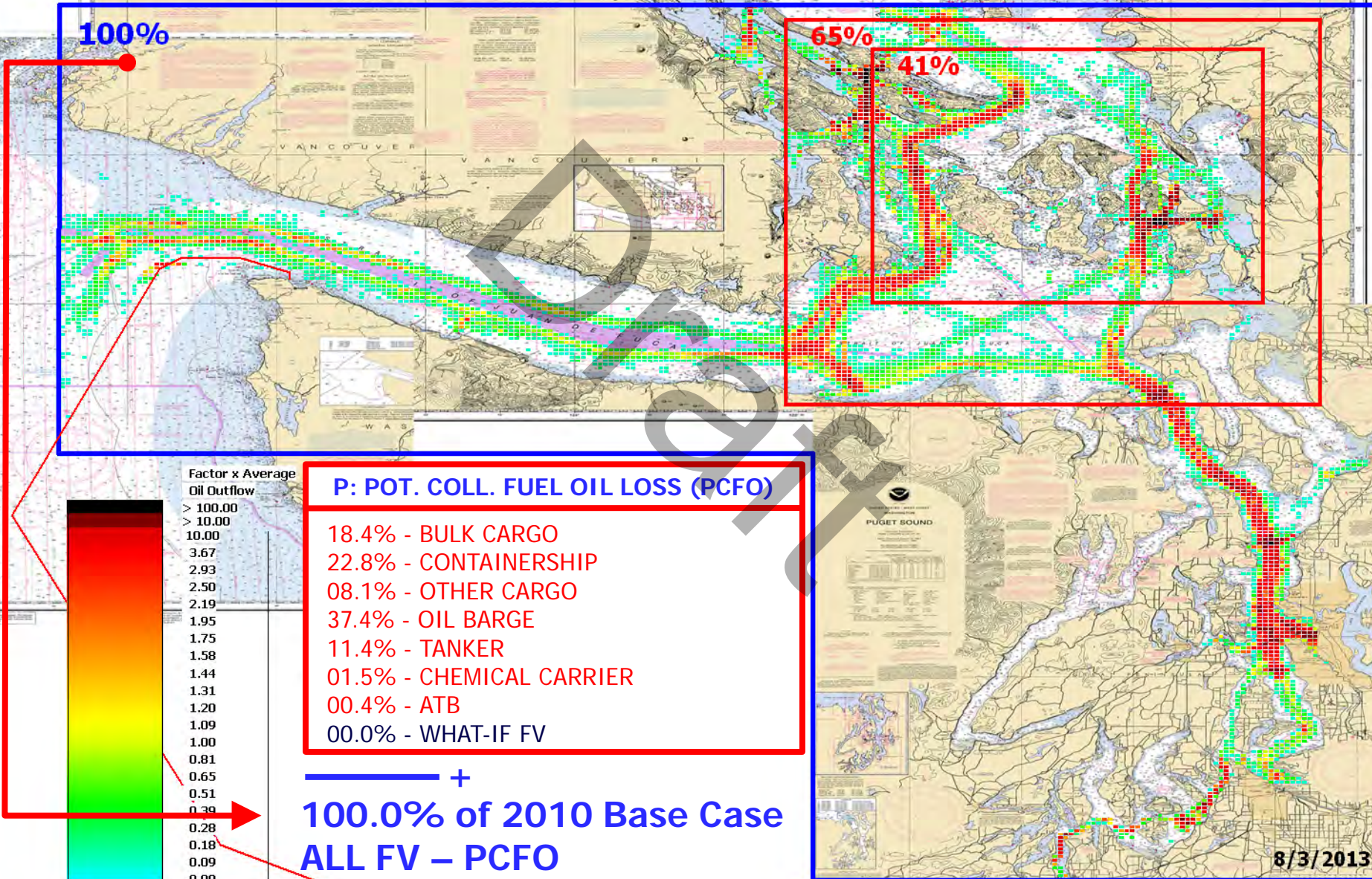
## T: POTENTIAL COLL. OIL LOSS (PCO)

- 21.1% - BULKCARRIER
- 00.9% - CONTAINERSHIP
- 74.5% - OIL TANKER
- 10.6% - OIL BARGE

— +  
**107.1% of 2010 Base Case**  
**ALL FV – PCO**

**P: ALL FV POTENTIAL COLLISION FUEL OIL LOSS (PCFO)**

**P: VTRA 2010 - BASE CASE**



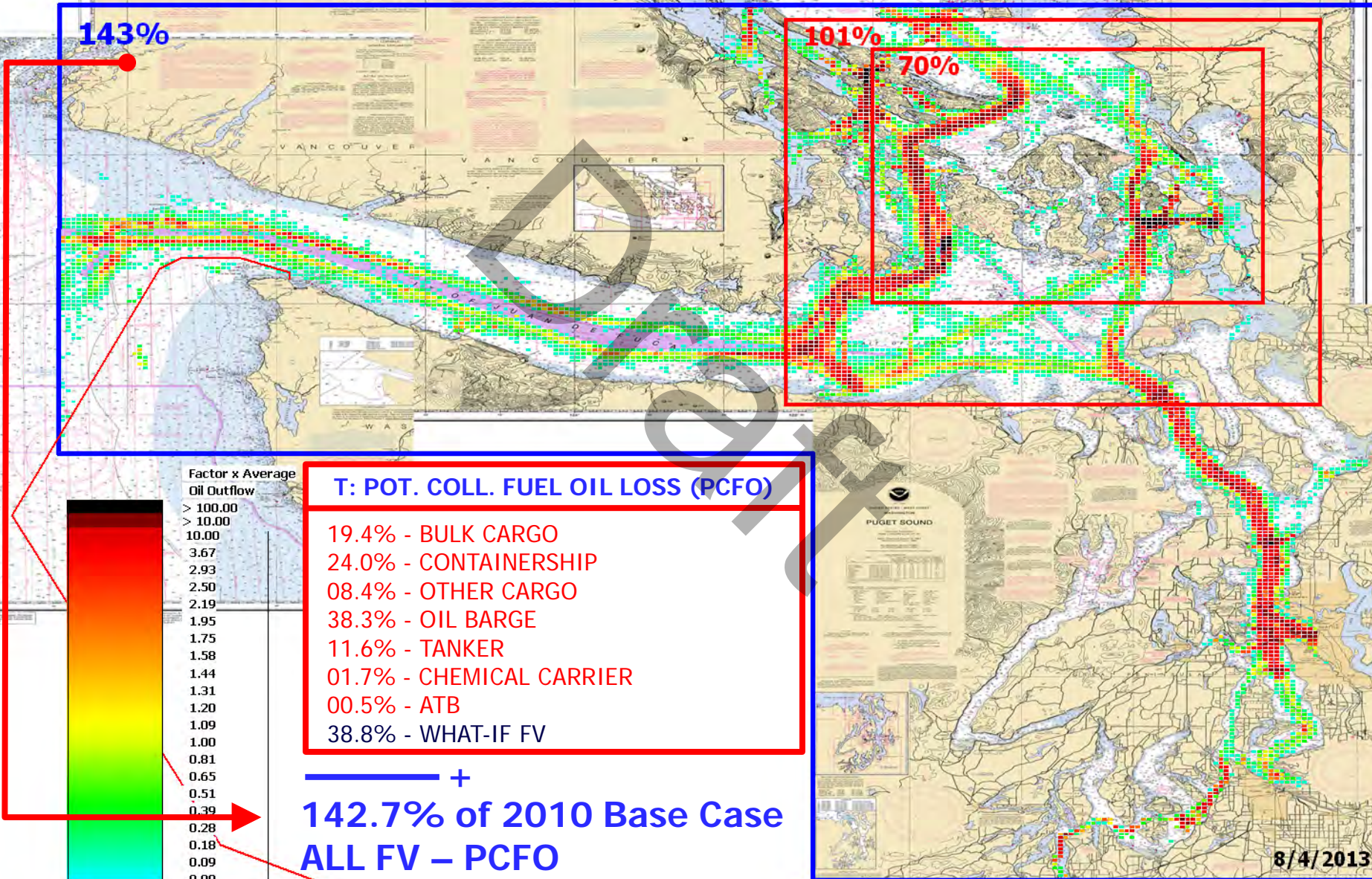
**P: POT. COLL. FUEL OIL LOSS (PCFO)**

- 18.4% - BULK CARGO
- 22.8% - CONTAINERSHIP
- 08.1% - OTHER CARGO
- 37.4% - OIL BARGE
- 11.4% - TANKER
- 01.5% - CHEMICAL CARRIER
- 00.4% - ATB
- 00.0% - WHAT-IF FV

**100.0% of 2010 Base Case  
ALL FV – PCFO**

**T: ALL FV POTENTIAL COLLISION FUEL OIL LOSS (PCFO)**

**T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348**



143%

101%

70%

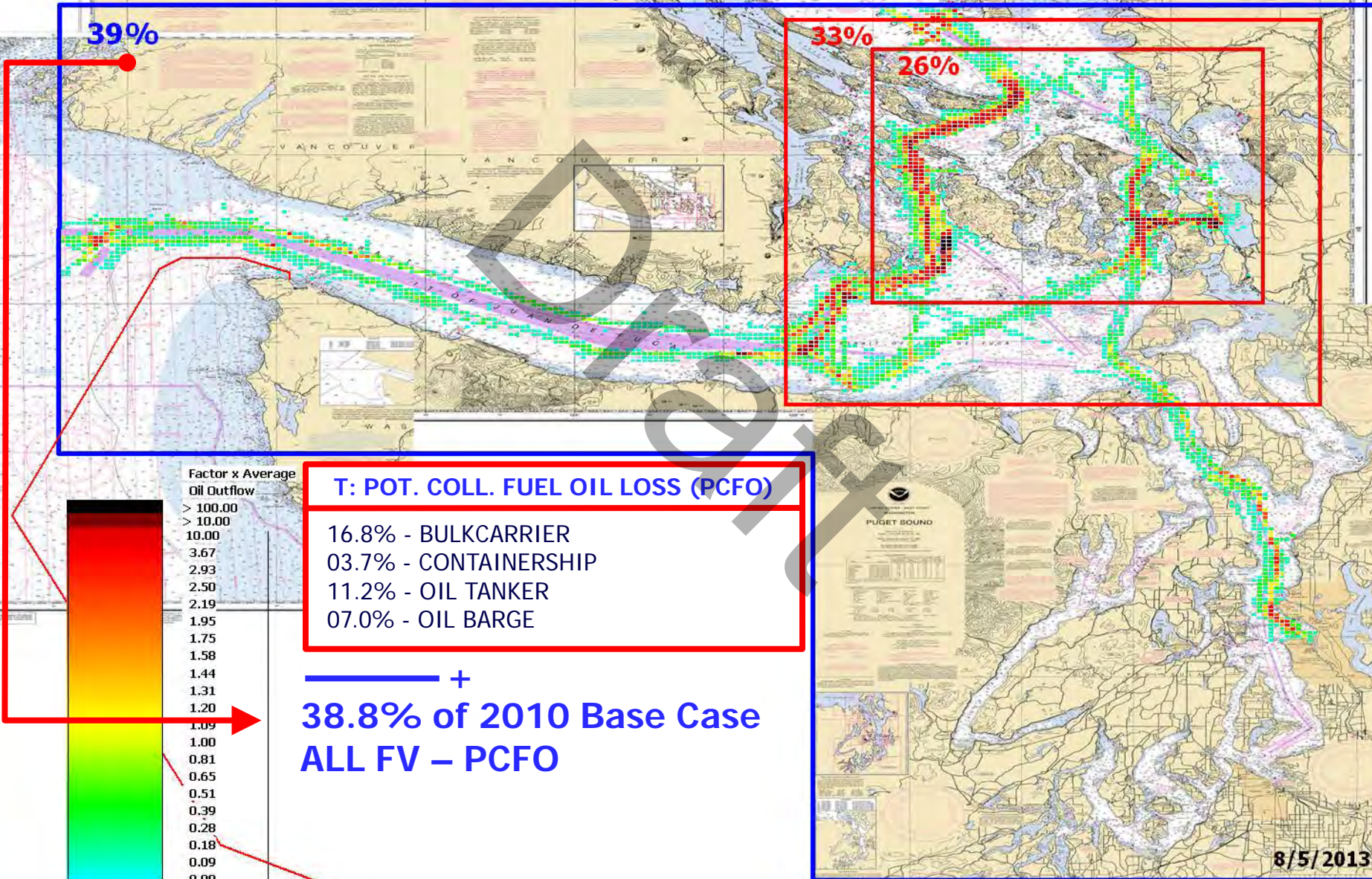
**T: POT. COLL. FUEL OIL LOSS (PCFO)**

- 19.4% - BULK CARGO
- 24.0% - CONTAINERSHIP
- 08.4% - OTHER CARGO
- 38.3% - OIL BARGE
- 11.6% - TANKER
- 01.7% - CHEMICAL CARRIER
- 00.5% - ATB
- 38.8% - WHAT-IF FV

+  
**142.7% of 2010 Base Case  
ALL FV - PCFO**

# T: WHAT-IF FV POTENTIAL COLLISION FUEL OIL LOSS (PCFO)

T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348



39%

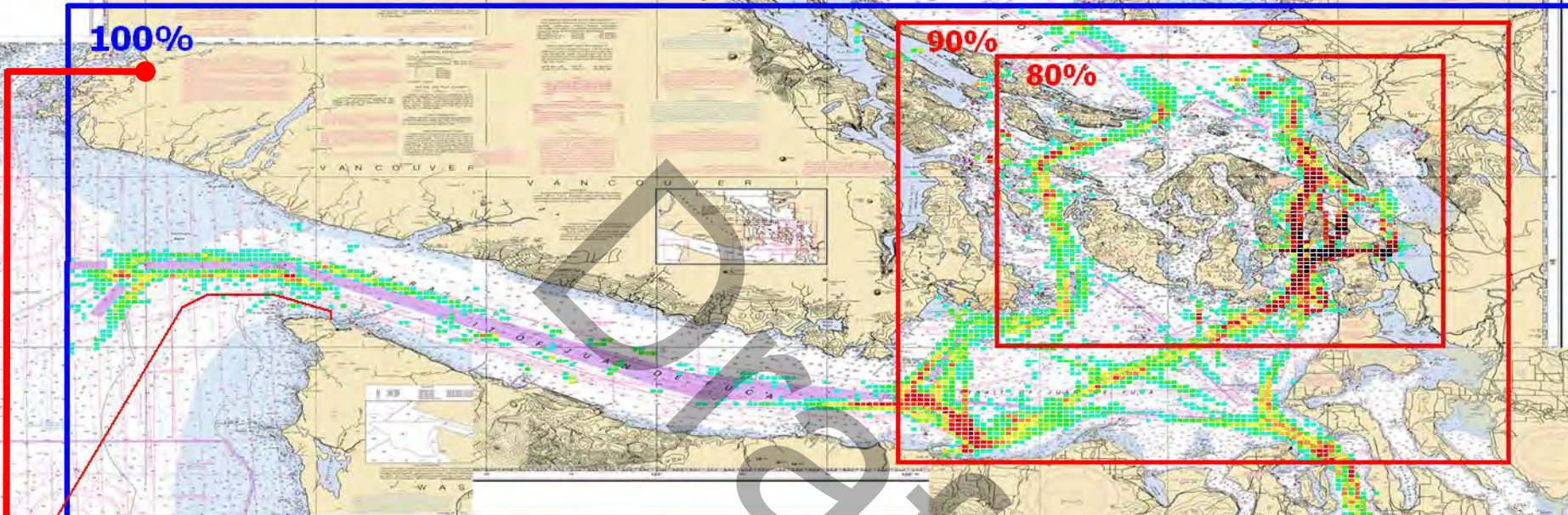
33%

26%



**P: ALL FV POTENTIAL COLLISION CARGO OIL LOSS (PCCO)**

**P: VTRA 2010 - BASE CASE**



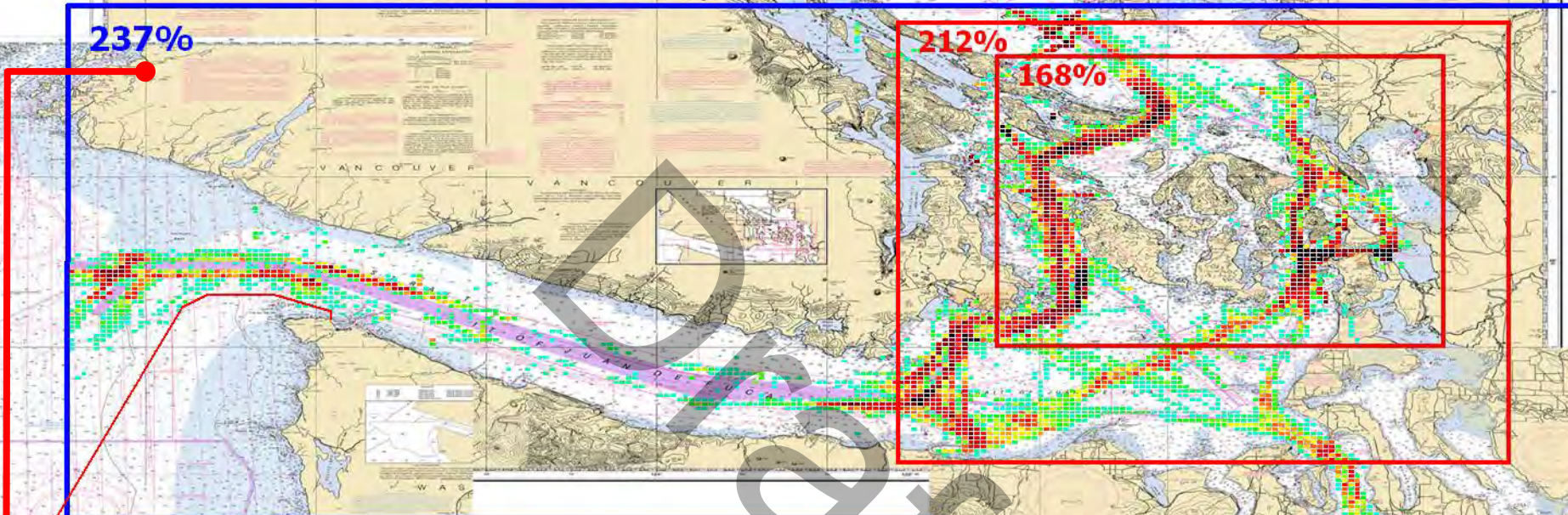
**P: POT. COLL. CARGO OIL LOSS (PCCO)**

- 00.8% - BULK CARGO
- 01.4% - CONTAINERSHIP
- 00.6% - OTHER CARGO
- 09.3% - OIL BARGE
- 84.0% - TANKER
- 02.5% - CHEMICAL CARRIER
- 01.3% - ATB
- 00.0% - WHAT-IF FV

**100.0% of 2010 Base Case  
ALL FV - PCCO**

**T: ALL FV POTENTIAL COLLISION CARGO OIL LOSS (PCCO)**

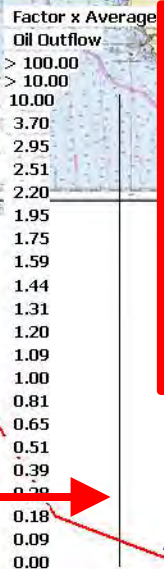
**T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348**



237%

212%

168%

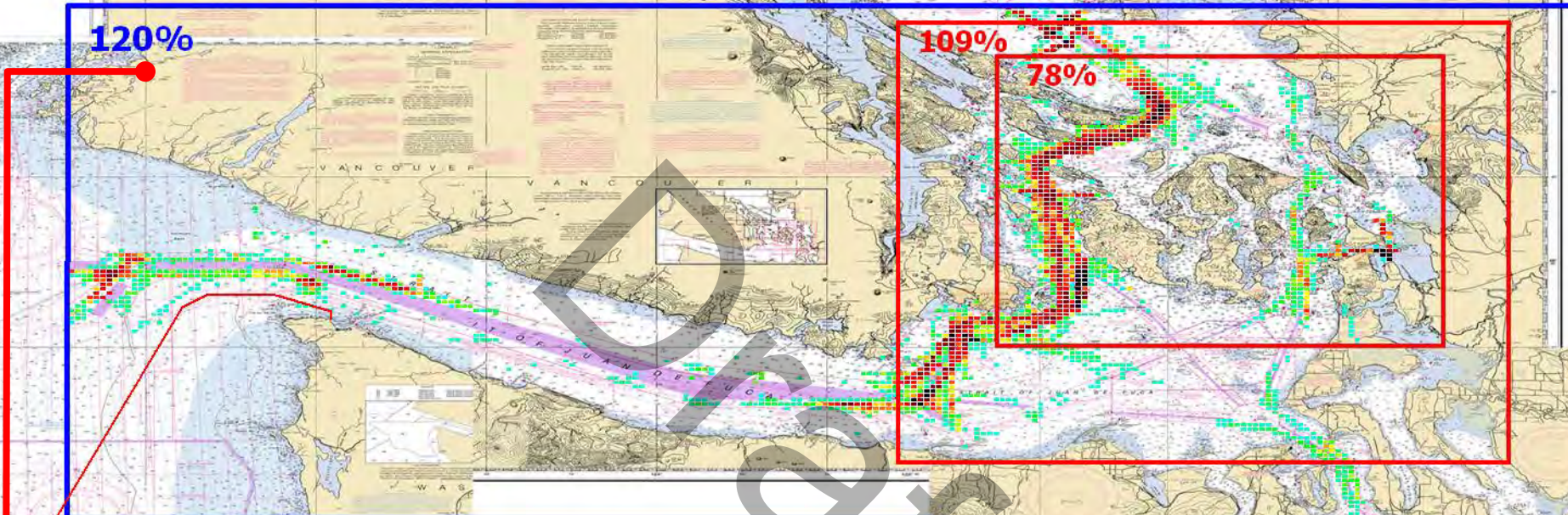


- T: POT. COLL. CARGO OIL LOSS (PCCO)**
- 03.8% - BULK CARGO
  - 04.1% - CONTAINERSHIP
  - 01.8% - OTHER CARGO
  - 24.2% - OIL BARGE
  - 78.8% - TANKER
  - 02.9% - CHEMICAL CARRIER
  - 01.3% - ATB
  - 120% - WHAT-IF FV

**237.3% of 2010 Base Case ALL FV – PCCO**

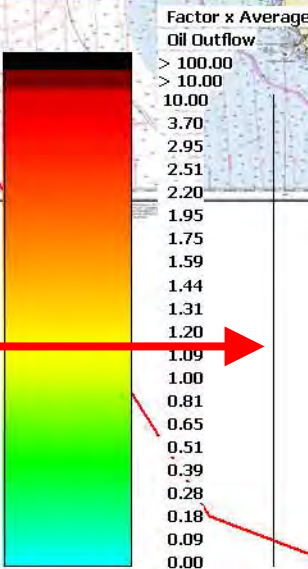
**T: WHAT-IF FV POTENTIAL COLLISION FUEL OIL LOSS(PCFO)**

**T: VTRA 2010 - GW 487- KM 348 - DP Cont. 67 and Bulk 348**



**T: POT. COLL. CARGO OIL LOSS (PCCO)**

- 22.0% - BULKCARRIER
- 00.3% - CONTAINERSHIP
- 86.8% - OIL TANKER
- 11.3% - OIL BARGE

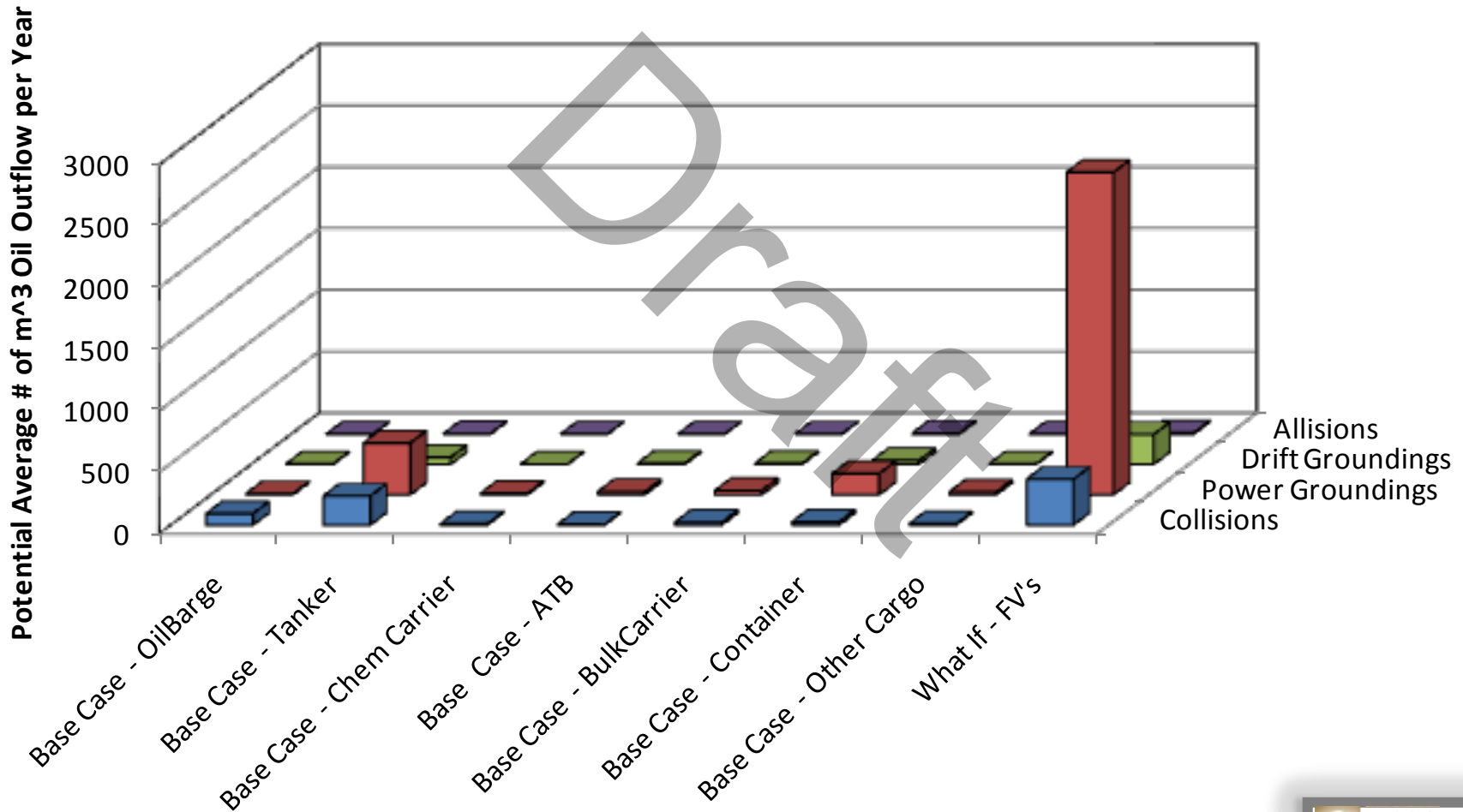


**120.4% of 2010 Base Case ALL FV – PCCO**

# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ACCIDENT FREQUENCY AND ACCIDENT TYPE

## CASE T: GW 487, KM 348, DP 348 and 67:

T - VTRA 2010 : Potential Average # of m<sup>3</sup> Oil Outflow per Year



**T - VTRA 2010 : Potential Average # of m<sup>3</sup> Oil Outflow per Year**

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	26.5%	1.2%	3.7%	0.0%	9.1%
Base Case - Tanker	67.9%	61.7%	49.3%	23.4%	61.9%
Base Case - Chem Carrier	2.7%	1.6%	1.6%	0.0%	1.9%
Base Case - ATB	1.2%	3.5%	7.8%	0.0%	3.2%
Base Case - All Tank FV's	98.2%	68.0%	62.4%	23.4%	76.0%
Base Case - BulkCarrier	6.4%	5.0%	6.9%	11.3%	5.7%
Base Case - Container	7.3%	25.1%	28.1%	51.8%	20.3%
Base Case - Other Cargo	2.9%	3.3%	4.0%	9.9%	3.3%
Base Case - All Cargo FV's	16.6%	33.4%	39.1%	73.0%	29.3%
Base Case - All FV's	114.8%	101.4%	101.5%	96.4%	105.4%
What If - FV's	107.0%	384.5%	214.9%	72.2%	281.0%
Total - Base Case + What- IF	221.9%	485.9%	316.4%	168.6%	386.4%

**T - VTRA 2010 : Potential Average # of m<sup>3</sup> Oil Outflow per Year**

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	92.0	8.4	4.2	0.0	104.6
Base Case - Tanker	235.5	420.5	55.8	2.9	714.7
Base Case - Chem Carrier	9.4	10.6	1.9	0.0	21.9
Base Case - ATB	4.1	23.8	8.8	0.0	36.7
Base Case - All Tank FV's	340.9	463.4	70.6	2.9	877.9
Base Case - BulkCarrier	22.2	34.4	7.8	1.4	65.8
Base Case - Container	25.5	170.8	31.9	6.5	234.6
Base Case - Other Cargo	10.0	22.5	4.6	1.2	38.3
Base Case - All Cargo FV's	57.7	227.7	44.2	9.2	338.8
Base Case - All FV's	398.6	691.2	114.9	12.1	1216.7
What If - FV's	371.4	2620.7	243.2	9.1	3244.4
Total - Base Case + What- IF	770.0	3311.9	358.1	21.2	4461.1