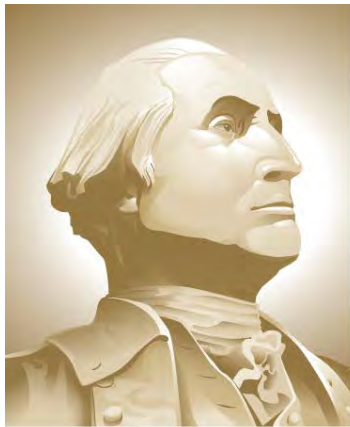


# **VTRA 2010 POTENTIAL GROUNDING FREQUENCY BY ALL FV, CARGO – FV, TANK- FV and WHAT-IF FV**

Presentation by: J. Rene van Dorp



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## **CASE Q: Gateway + Bunkering Operations**

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**VCU Personnel:** Dr. Jason R. W. Merrick

## **AUGUST 28, 2013**

**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	OTHERSPECIFICSERV	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**.



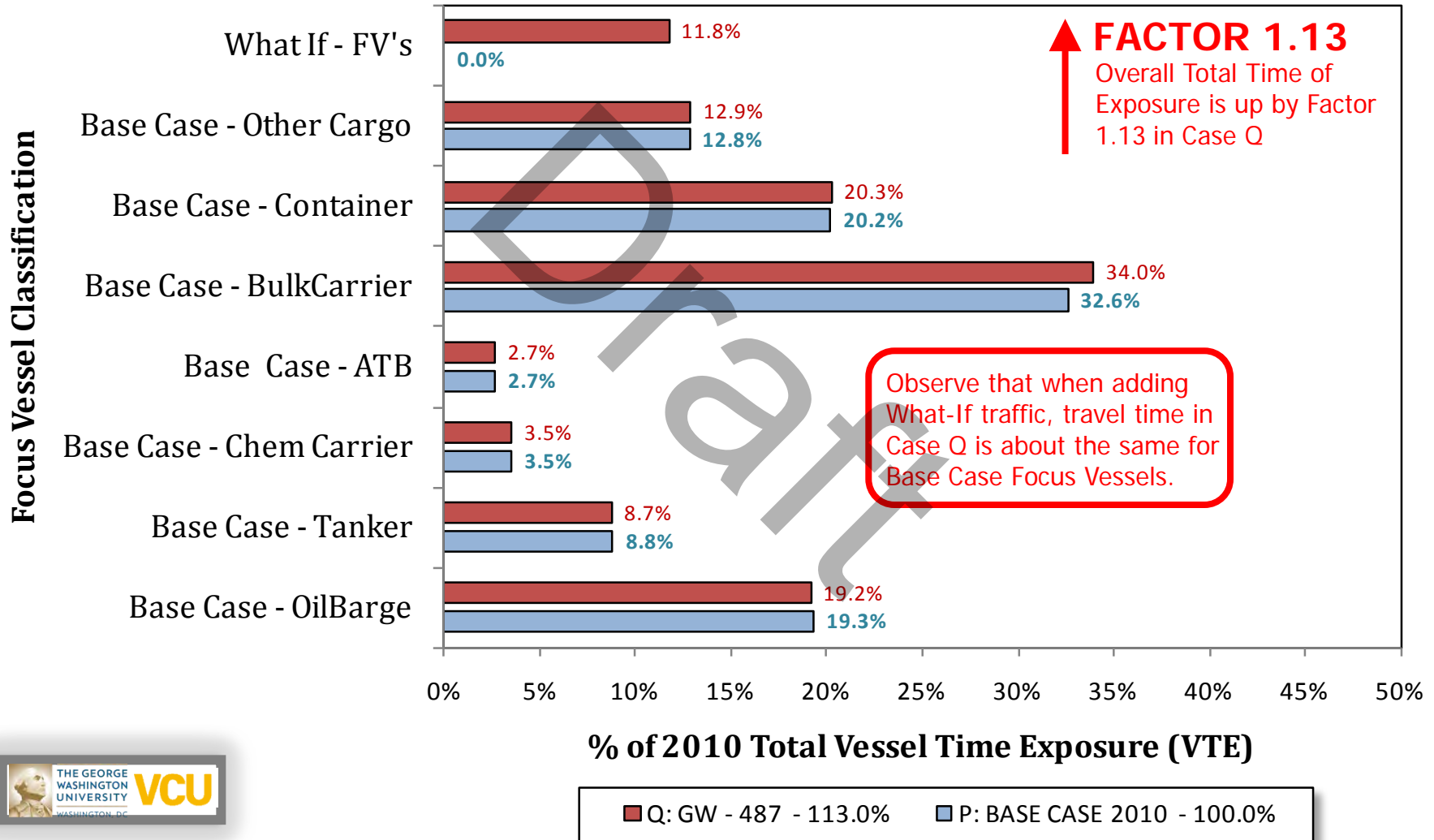
# **CASE Q: GW 487 + Bunkering Operations:**

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

487 Gateway Bulk Carriers + Bunkering Barges

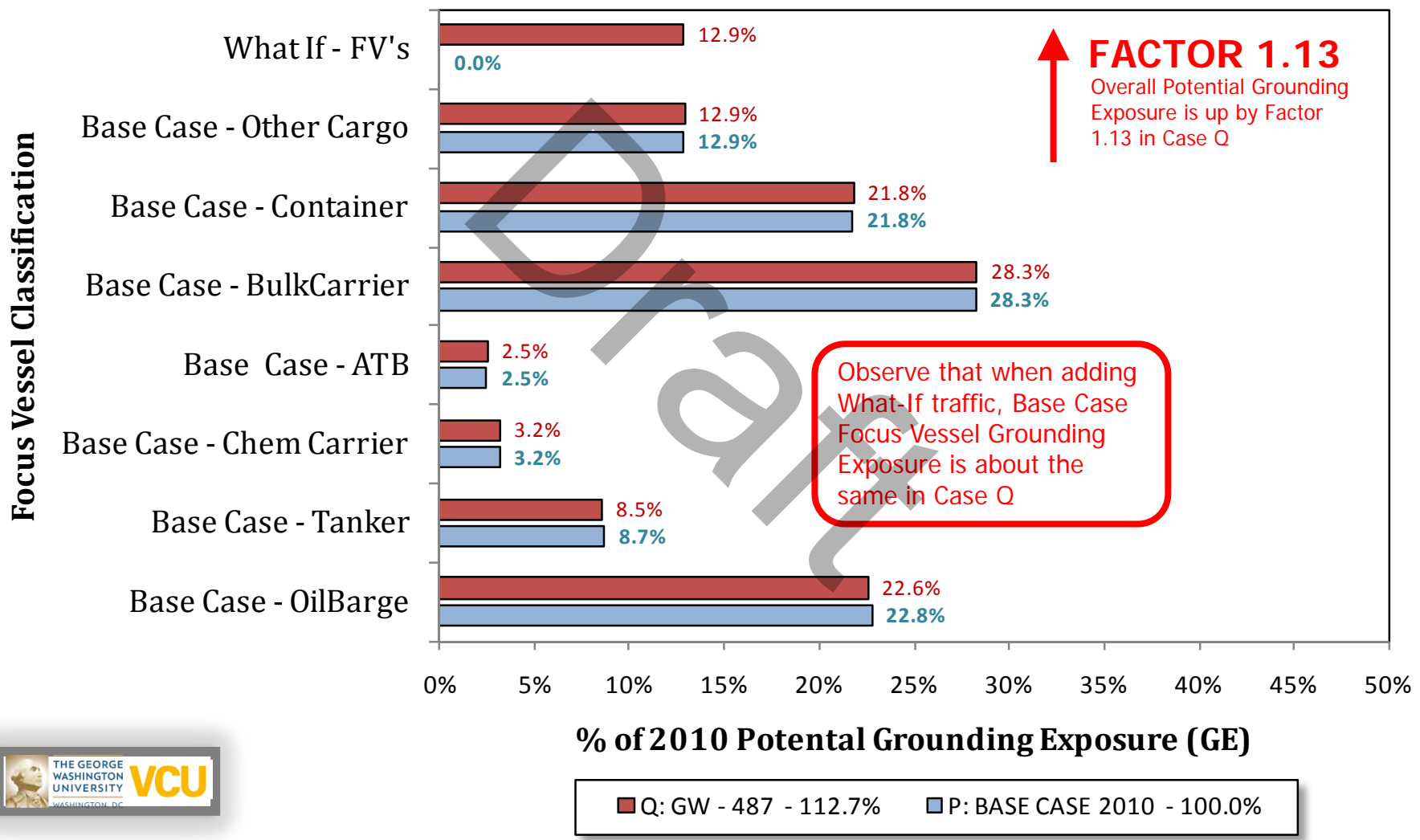
# CASE Q: GW 487 + BUNKERING

## VTRA 2010 - Total Vessel Time of Exposure (VTE)



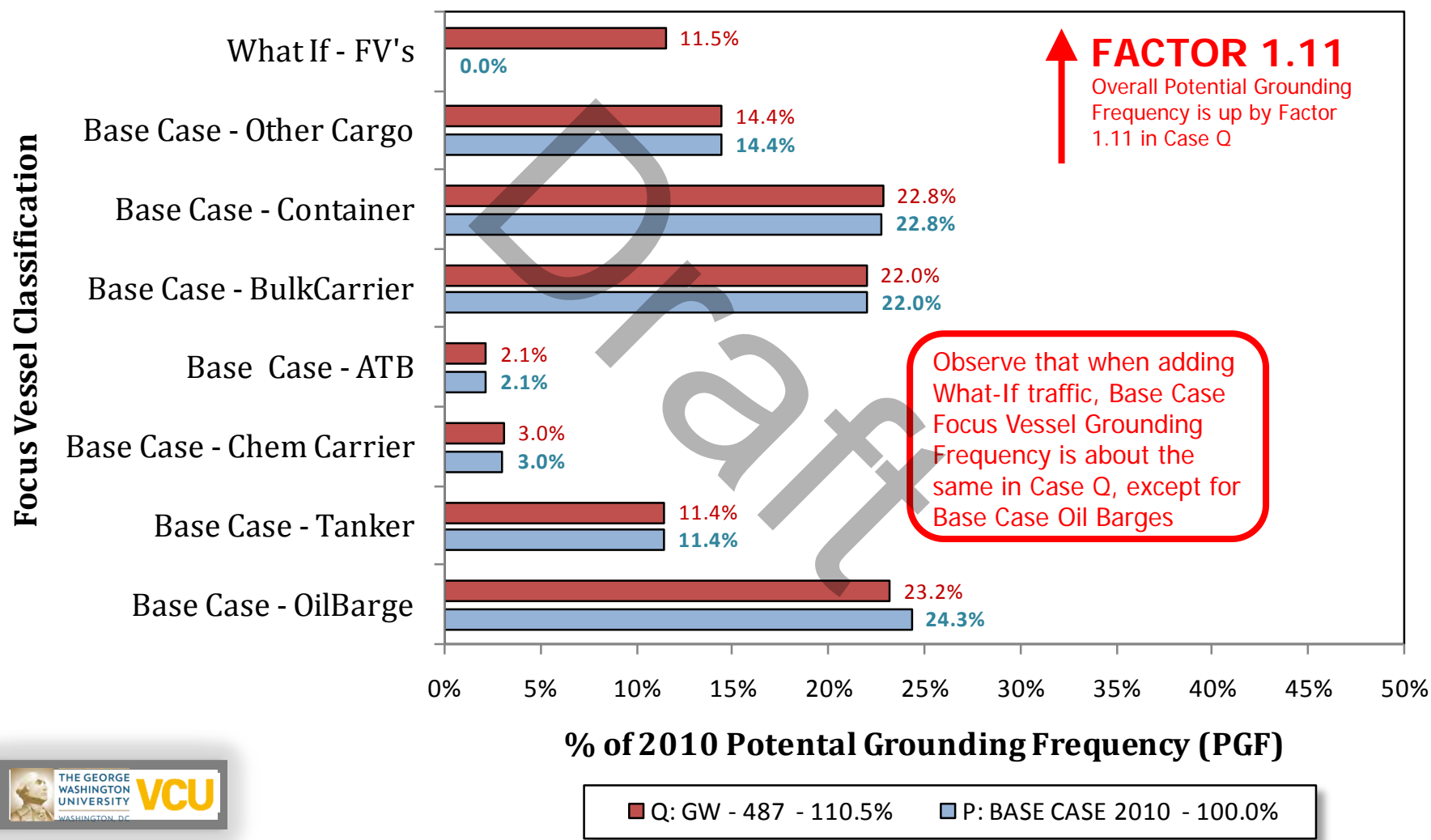
# CASE Q: GW 487 + BUNKERING

## VTRA 2010 - GROUNDING EXPOSURE



# CASE Q: GW 487 + BUNKERING

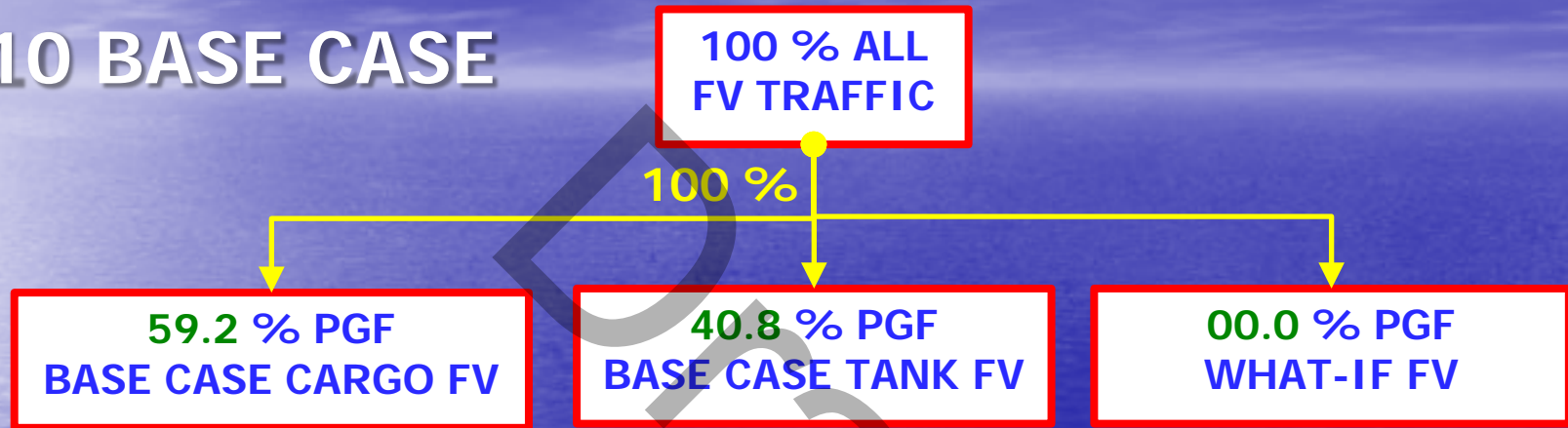
## VTRA 2010 - GROUNDING FREQUENCY



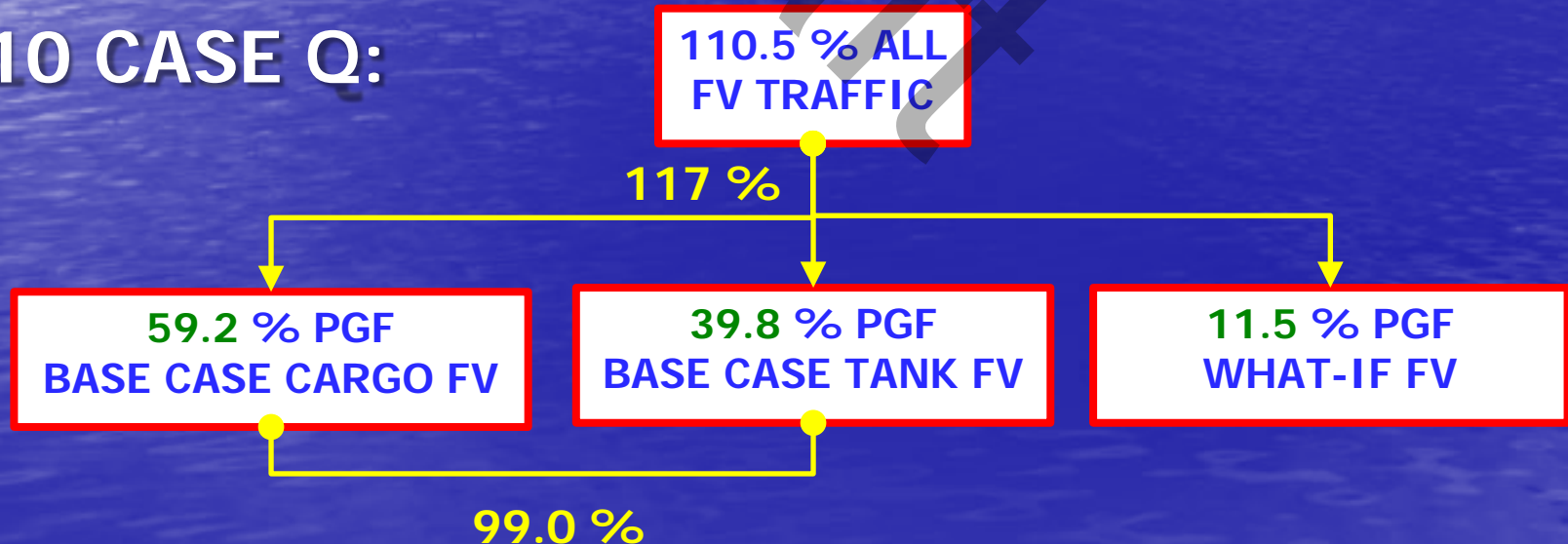
# A TAXONOMY OF 2010 FOCUS VESSEL POTENTIAL ANNUAL GROUNDING FREQUENCY

PCF : POTENTIAL GROUNDING FREQUENCY - PER YEAR

## 2010 BASE CASE



## 2010 CASE Q:

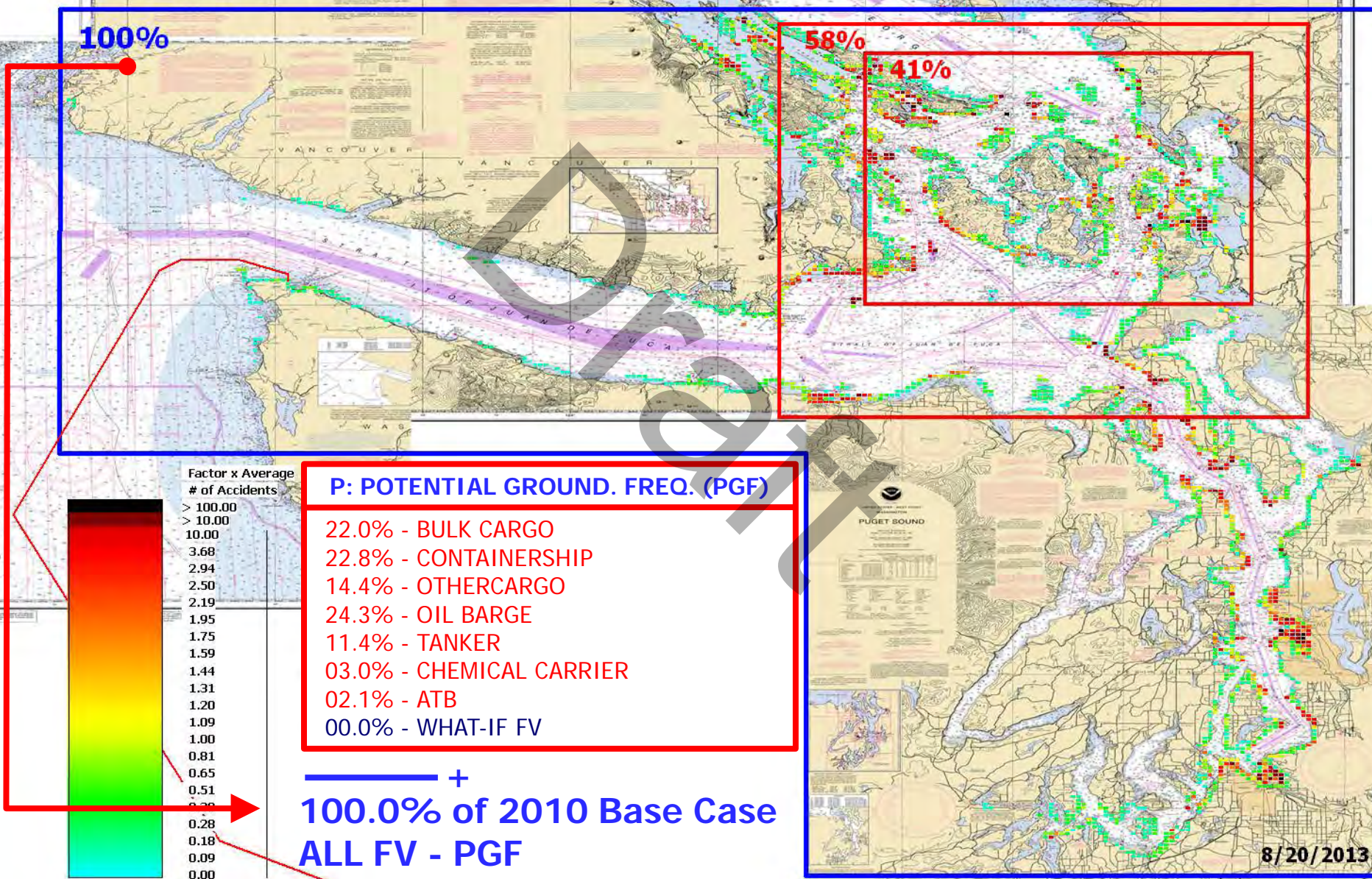






# **P: ALL FV POTENTIAL GROUNDING FREQUENCY (PGF)**

**P: VTRA 2010 - BASE CASE**







# Q: ALL FV POTENTIAL GROUNDING FREQUENCY (PGF)

Q: VTRA 2010 - GATEWAY 487

110%

67%

49%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.38  
0.28  
0.18  
0.09  
0.00

Q: POTENTIAL GROUND. FREQ. (PGF)

22.0% - BULK CARGO  
22.8% - CONTAINERSHIP  
14.4% - OTHERCARGO  
23.2% - OIL BARGE  
11.4% - TANKER  
03.0% - CHEMICAL CARRIER  
02.1% - ATB  
11.5% - WHAT-IF FV

+  
**110.5% of 2010 Base Case**  
**ALL FV - PGF**



# Q: WHAT-IF FV POTENTIAL GROUNDING FREQUENCY (PGF)



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Q: VTRA 2010 - GATEWAY 487

11%

9%

9%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.39  
0.28  
0.18  
0.09  
0.00

Q: POTENTIAL GROUND. FREQ. (PGF)

07.8% - BULK CARGO  
00.0% - CONTAINERSHIP  
00.0% - TANKER  
03.7% - OILBARGE

+  
11.5% of 2010 Base Case  
ALL FV - PGF



# P: BASE CASE CARGO FV POTENTIAL GROUNDING FREQUENCY (PGF)



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P: VTRA 2010 - BASE CASE

59%

33%

22%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.39  
0.28  
0.18  
0.09  
0.00

CASE P: POT. GROUND. FREQ. (PGF)

22.0% - BULK CARGO  
22.8% - CONTAINERSHIP  
14.4% - OTHERCARGO  
00.0% - WHAT-IF FV

59.2% of 2010 Base Case  
ALL FV - PGF



# Q: BASE CASE CARGO FV POTENTIAL GROUNDING FREQUENCY (PGF)



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Q: VTRA 2010 - GATEWAY 487

59%

33%

22%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.39  
0.28  
0.18  
0.09  
0.00

CASE Q: POT. GROUND. FREQ. (PGF)

22.0% - BULK CARGO  
22.8% - CONTAINERSHIP  
14.4% - OTHERCARGO  
00.0% - WHAT-IF FV

59.2% of 2010 Base Case  
ALL FV - PGF



# P: BASE CASE TANK FV POTENTIAL GROUNDING FREQUENCY (PGF)



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P: VTRA 2010 - BASE CASE

41%

26%

19%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.39  
0.28  
0.18  
0.09  
0.00

CASE P: POT. GROUND. FREQ. (PGF)

24.3% - OILBARGE  
11.4% - OILTANKER  
03.0% - CHEMICALCARRIER  
02.1% - ATB  
00.0% - WHAT-IF FV

— +  
40.8% of 2010 Base Case  
ALL FV - PGF



# Q: BASE CASE TANK FV POTENTIAL GROUNDING FREQUENCY (PGF)



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Q: VTRA 2010 - GATEWAY 487

40%

25%

18%

Factor x Average  
# of Accidents

> 100.00  
> 10.00  
10.00  
3.68  
2.94  
2.50  
2.19  
1.95  
1.75  
1.59  
1.44  
1.31  
1.20  
1.09  
1.00  
0.81  
0.65  
0.51  
0.39  
0.28  
0.18  
0.09  
0.00

CASE Q: POT. GROUND. FREQ. (PCF)

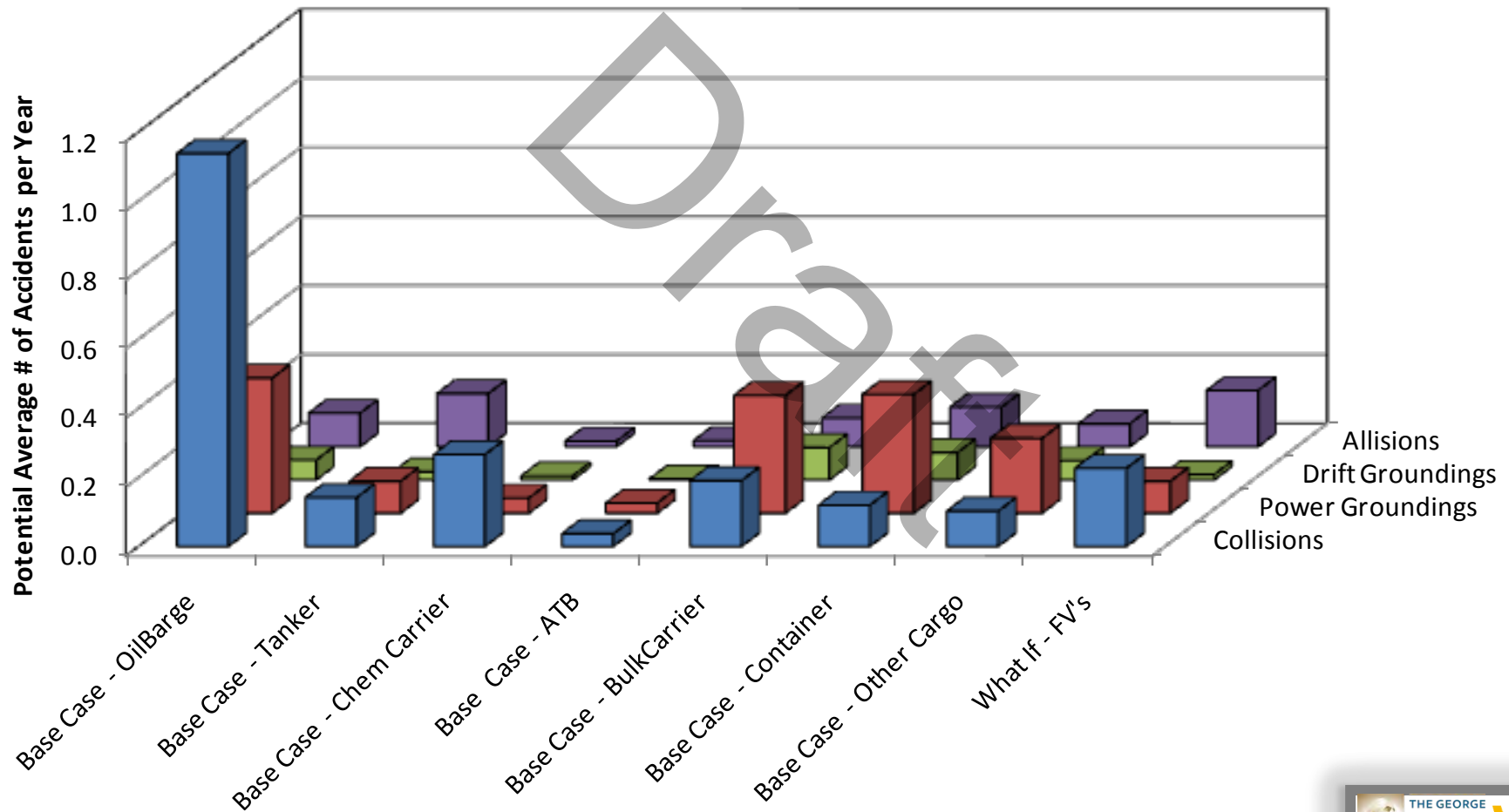
23.2% - OILBARGE  
11.4% - OILTANKER  
03.0% - CHEMICALCARRIER  
02.1% - ATB  
00.0% - WHAT-IF FV

— +  
**39.8% of 2010 Base Case  
TANK FV - PGF**

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

## CASE Q: GW 487 + BUNKERING

Q - VTRA 2010 : Potential Average # of Accidents per Year





## Q - VTRA 2010 : Potential Average # of Accidents per Year

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	58.0%	26.4%	17.6%	17.8%	39.0%
Base Case - Tanker	7.2%	6.2%	7.1%	28.1%	9.5%
Base Case - Chem Carrier	13.6%	3.0%	3.6%	2.9%	7.8%
Base Case - ATB	1.9%	2.0%	1.0%	3.2%	2.0%
Base Case - All Tank FV's	80.7%	37.6%	29.3%	52.0%	58.4%
Base Case - BulkCarrier	9.7%	23.0%	28.4%	15.2%	16.4%
Base Case - Container	6.1%	23.2%	24.1%	21.0%	15.2%
Base Case - Other Cargo	5.2%	14.6%	17.2%	12.2%	10.2%
Base Case - All Cargo FV's	21.0%	60.9%	69.7%	48.3%	41.9%
Base Case - All FV's	101.7%	98.5%	99.0%	100.4%	100.2%
What If - FV's	11.5%	6.2%	4.8%	29.8%	11.5%
Total - Base Case + What- IF	113.3%	104.7%	103.8%	130.2%	111.7%

## Q - VTRA 2010 : Potential Average # of Accidents per Year

Focus Vessel	Collisions	Power Groundings	Drift Groundings	Allisions	Total
Base Case - OilBarge	1.14	0.39	0.06	0.10	1.68
Base Case - Tanker	0.14	0.09	0.02	0.15	0.41
Base Case - Chem Carrier	0.27	0.04	0.01	0.02	0.34
Base Case - ATB	0.04	0.03	0.00	0.02	0.09
Base Case - All Tank FV's	1.58	0.56	0.10	0.28	2.52
Base Case - BulkCarrier	0.19	0.34	0.09	0.08	0.71
Base Case - Container	0.12	0.34	0.08	0.11	0.66
Base Case - Other Cargo	0.10	0.22	0.06	0.07	0.44
Base Case - All Cargo FV's	0.41	0.90	0.23	0.26	1.81
Base Case - All FV's	1.99	1.46	0.33	0.55	4.33
What If - FV's	0.23	0.09	0.02	0.16	0.50
Total - Base Case + What- IF	2.22	1.55	0.34	0.71	4.82