CUSTODY TRANSFER MEASUREMENT & OIL LOSS CONTROL

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WHEN YOU NEED TO BE SURE

SGS

OIL LOSS CONTROL

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Question …

In your opinion, what are the possible reasons or factors for Gain or Losses ?

- S+W
- Meter Factor
- ???

Oil Loss Control Concept

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Typical reason for Gain or Loss

- ✓ physical gains or losses, 40%
- ✓ discrepancies or errors in volume measurement, sampling and laboratory testing methods, 50%
- ✓ inconsistencies or errors in calculations, 10%

Typical physical Gain & Loss

- ✓ Evaporative Loss
- ✓ Cargo Retention
- ✓ Cargo Diversion
- ✓ Undetected ROB

Typical measurement Gain or Loss

- ✓ Calibration Errors
- ✓ Gauging Errors
- ✓ Temperature Errors
- ✓ Sampling Errors
- ✓ Testing Errors
- ✓ ……

Typical paper Gain or Loss

- ✓ Measurement Tables Errors
- ✓ Calculation Errors

Voyage Analysis

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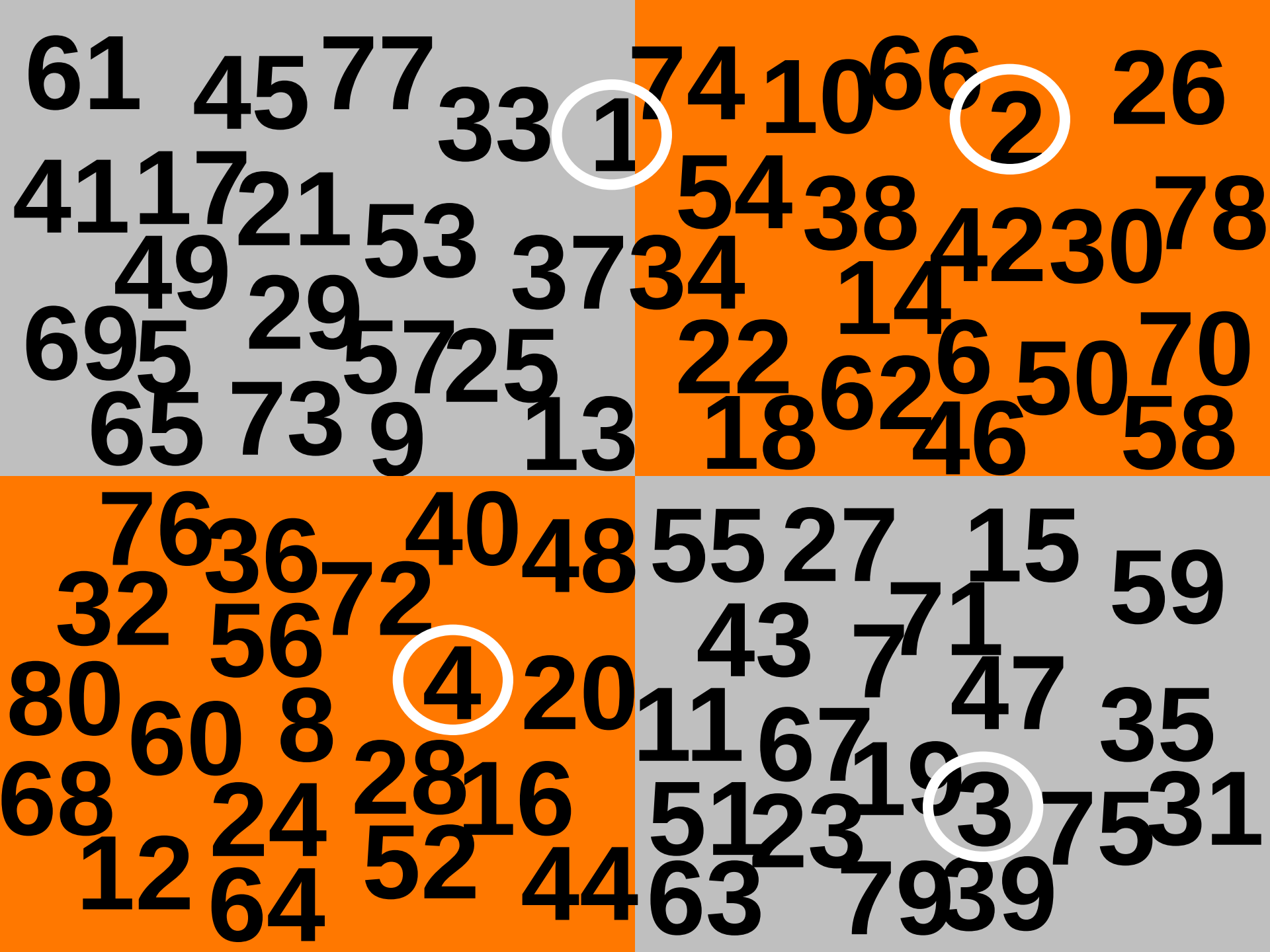
Question …

In your opinion, what are the possible reasons or factors for **Gain** or **Losses** ? …


API • Automatic Sampling • Cargo Characteristics • Cargo Size
• Clingage • Contamination • CPL • CPS • Crude Oil Type •
Crude Oil Washing • CTL • CTS • Density • Discharge Operation
• Electronic Equipment • Equipment
Bill of Lading
Calibration • Evaporation • Loss • Floating
Roof • Free Water • Heated Cargo • Inert Gas • Transit Difference
• K-Factor • Laboratory Analysis • Leakage • Lightering • Line
Adjustment • Line Displacement • Line Fullness • Loading Operation • Manual
Sampling • Measurement Equipment • Measurement Uncertainty
• Meter Factor • Meter Proving • Meters • New Table • OBQ •
Old Table • Part Cargo • Pour Point • Pressure • Prover
Calibration • Prover Water Draw • Quantity Calculation
• Relative Density • ROB • RVP • S+W • Sea Condition • Ship's
Draft • Ship's Tanks • Shipboard sampler • Shore Pipelines •
Shore Tanks • Outturn • Simultaneous Operations • Slops
• Sulphur • Tank Calibration • Tank Cleaning
• Temperature • Test Methods • Transhipment • Trim Correction
• Undetected ROB • VCF Table • VEF • Vessel Pipelines • Viscosity •
Volumetric Shrinkage • Water Draining • Wax • WCF Table • Wedge


61 45 77 33 1
74 10 66 2 26
41 17 21 53 49 29 69 5 57 25 65 73 9 13 37
54 38 42 30 78 34 14 22 6 62 50 70 18 46 58
76 36 40 48 32 56 72 4 20 80 60 8 28 16 68 24 12 64 52 44
55 27 15 59 43 7 71 47 11 67 19 35 51 23 3 75 31 63 79 39

Shore to Vessel
Comparison at Loading

Vessel to Vessel
Comparison In-transit

Bill of Lading & Out-turn Comparison

Vessel to Shore
Comparison at Discharge

Vessel OBQ / ROB
Comparison

API Chapter 17.5

PORT / TERMINAL:	/			OFFICE:		TEL:		
VESSEL:	VOY #:			INSPECTOR(S):				
DATE:				FILE:				
CARGO:				CLIENT:		REF:		Example 1

VOYAGE ANALYSIS REPORT (VAR)

☐ Loading ☐ V/V Trans ☐ Discharge ☐ Summary			Type of Voyage		C/P DATE
Load Port/Terminal/Berth	Arrived	Sailed	Discharge Port/Terminal/Berth	Arrived	Sailed
			VCF Table Used:		

Volume Unit: ☒ Bbls ☐ Gals ☐ M ☐ L		Supplier	Receiver	Shore Loading	Shore Discharge		Vessel Loading	Vessel Discharge
				6A	6A		54A	54A
DESCRIPTION	**Density/API**	**TCV**	**FW**	**GSV**	**S+W%**	**S+W ***	**NSV**	**Reference**
I. COMPARISON OF SHORE QUANTITIES IN CUSTODY TRANSFER								
Bill of Lading 1.	34.50		0	186731.5	0.000			(1)
Outturn 2.	34.70		0	185717.0	0.193			(2)
Diff. 3.								(3)=(2)-(1)
Diff. % 4.								(4)=(3)/(1)x 100
Recalc. B/L 5.	(a)		Recalculate if B/L and O/T use different tables					(5) (a) Volume
II. VESSEL/SHORE QUANTITIES AT LOADING PORT								
Vessel Sailing A.			1230	186560.2	0.000			(A)
OBQ (All) B.			0		0		0	(B)
Loaded C.					LIQUID		NON-LIQUID	(C)=(A)-(B)
Difference D.								(D)=(C)-[1]OR[5]
Difference % E.								(E)=(D)/[1]OR[5]x 100
Load Vessel Ratio F.								(F)=(C)/[1]OR[5]
Load VEF G.		1.00321						(G)
Theoretical Shore H.								(H)=(C)/(G)
Theoretical Shore Diff. I.								(I)=(H)-[1]OR[5]
Theoretical Shore Diff. % J.								(J)=(I)/[1]OR[5]x 100
III. VESSEL/SHORE QUANTITIES AT DISCHARGE PORT								
Vessel Arrival K.			1144	186802.5	0.000			(K)
ROB (All) L.			0		384		391	(L)
Discharged M.					LIQUID		NON-LIQUID	(M)=(K)-(L)
Difference N.								(N)=(M)-(2)
Difference % O.								(O)=(N)/(2)x 100
Discharge Vessel Ratio P.								(P)=(M)/(2)
Discharge VEF Q.		1.00558						(Q)
Theoretical Shore R.								(R)=(M)/(Q)
Theoretical Shore Diff. S.								(S)=(2)-(R)
Theoretical Shore Diff. % T.								(T)=(S)/(2)x 100
IV. VESSEL/VESSEL COMPARISON AT LOADING AND DISCHARGE PORT(S) (VCF tables must be consistent)								
Transit Difference U.								(U)=(K)-(A)
Difference % V.						LIQUID	NON-LIQUID	(V)=(U)/(A)x 100
OBQ/ROB Difference W.								(W)=(B)-(L)

GSV Difference (3) - GSV OBQ (B) + GSV ROB (L)			* S+W Vol.(1) = S+W%(1) x GSV(1) /100	
Adj GSV Difference X.		%	* S+W Vol.(2) = S+W%(2) x GSV(2) /100	

Comments :				
Prepared by :	Title :		Office :	Date :

GAIN/LOSS QUANTIFIABLE FACTORS

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Cargo Gain/Loss Factors	Volume Difference	%
Bill of Lading/Outturn GSV Difference		
Bill of Lading/Outturn NSV Difference		

In-transit Difference		
Free water Difference		
S+W Difference		
OBQ/ROB Difference		
Vessel/Shore Diffrerence at Loading		
Vessel/Shore Diffrerence at Discharge		
VCF Table Difference		
~~Load/Discharge VEF difference~~		

Other Gain/Loss Factors

- ✓ In-Transit Difference
- ✓ Free Water Difference
- ✓ S+W Difference
- ✓ OBQ/ROB Difference
- ✓ Shore/Ship Difference at Loading
- ✓ Ship/Shore Difference at Discharge
- ✓ VCF or Ctl Tables Difference

OTHER GAIN/LOSS FACTORS

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Other Gain/Loss Factors

- ✓ Volumetric Shrinkage
- ✓ Evaporation Losses
- ✓ Crude Oil Washing
- ✓ Undetected ROB
- ✓ Pipelines Contents

STATISTICAL 2006 - 2015 ANALYSIS

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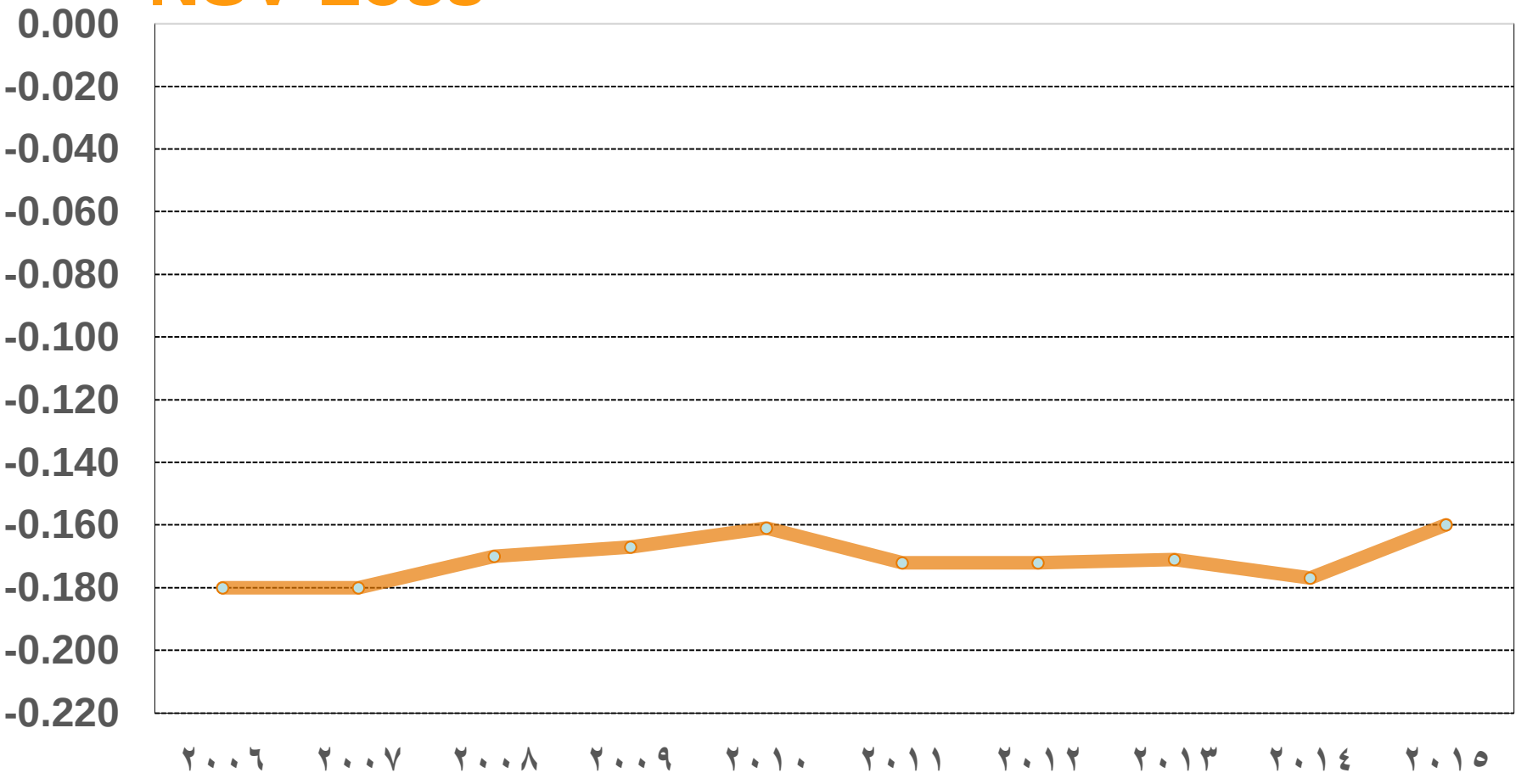
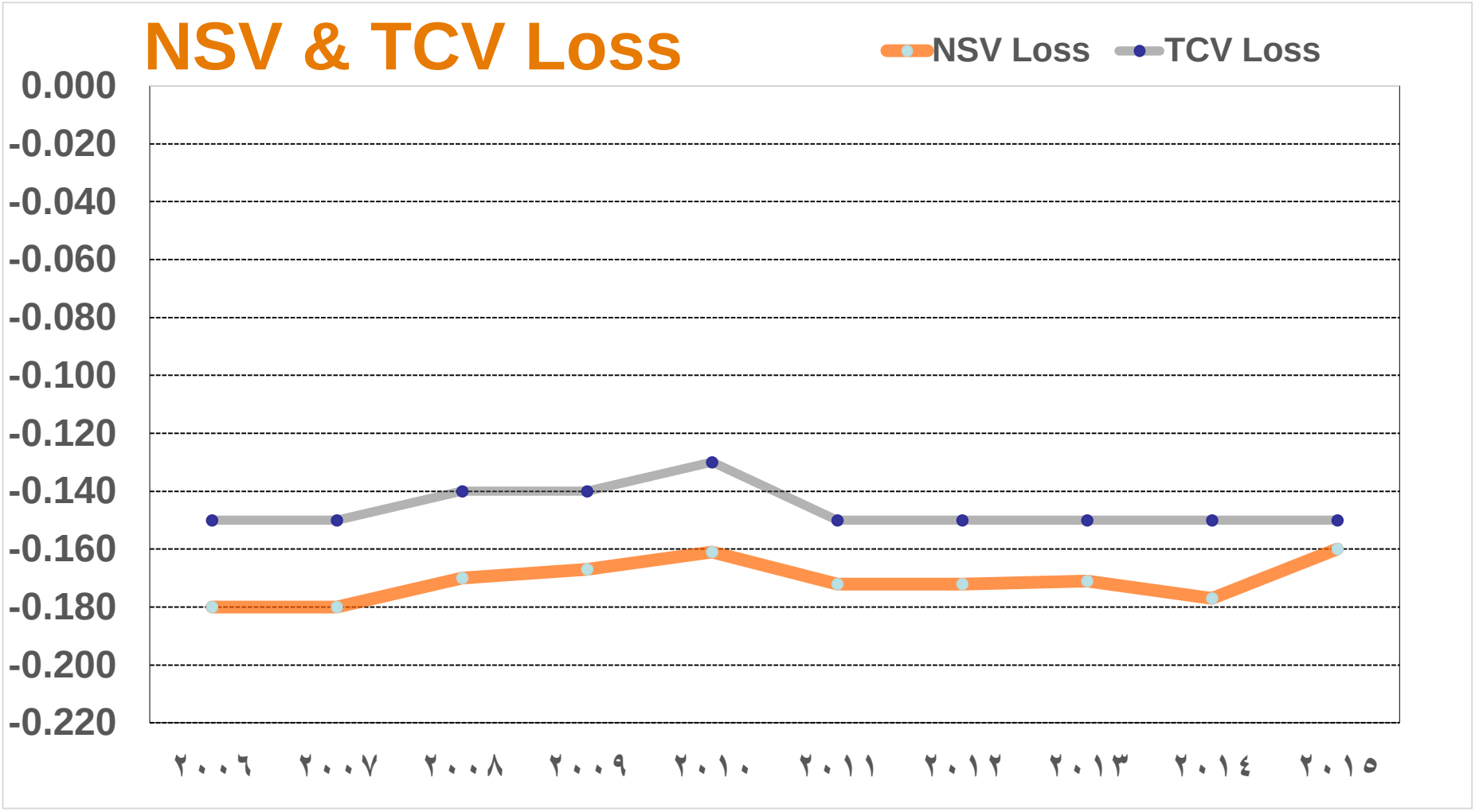
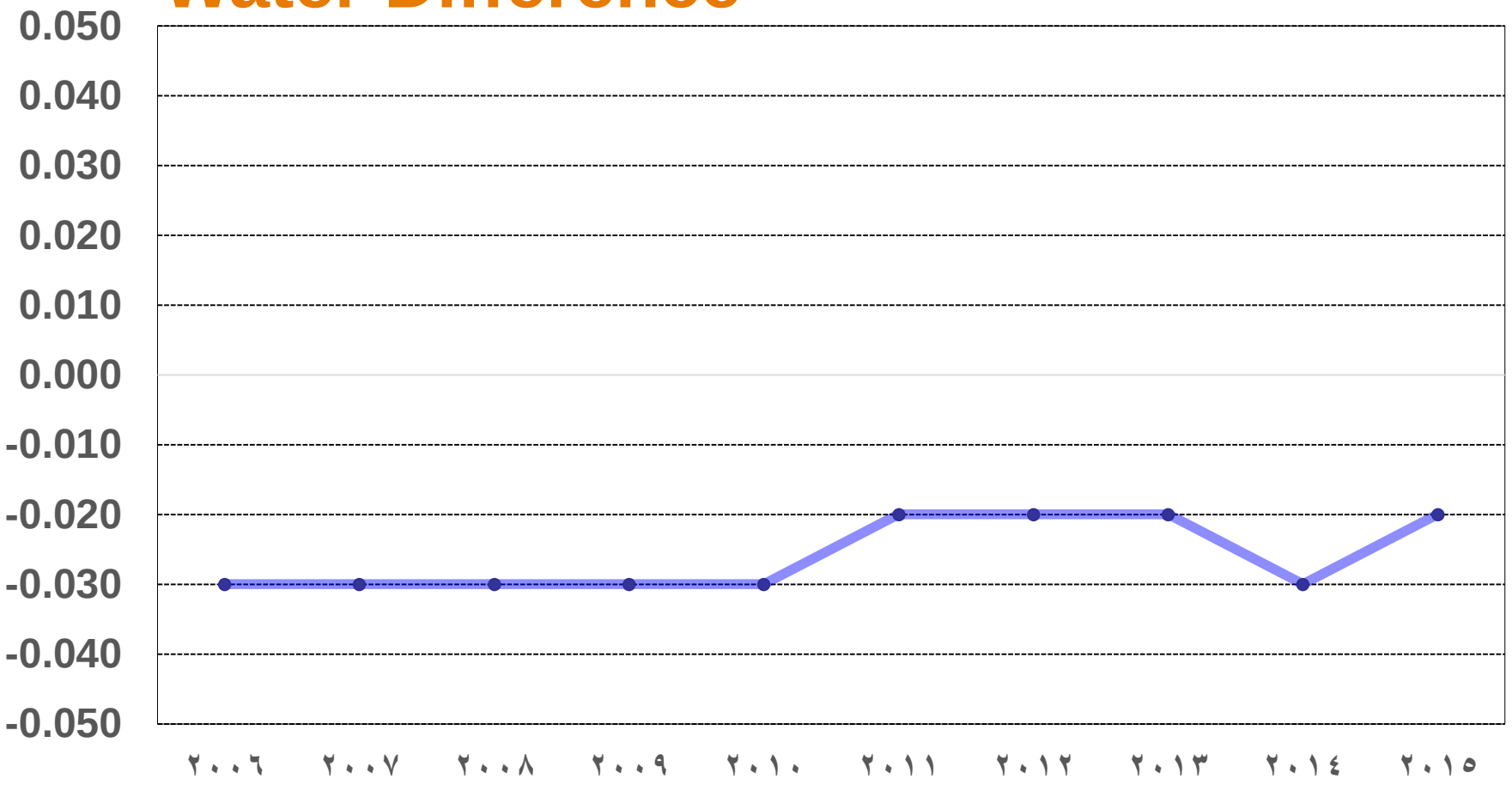
NSV Loss

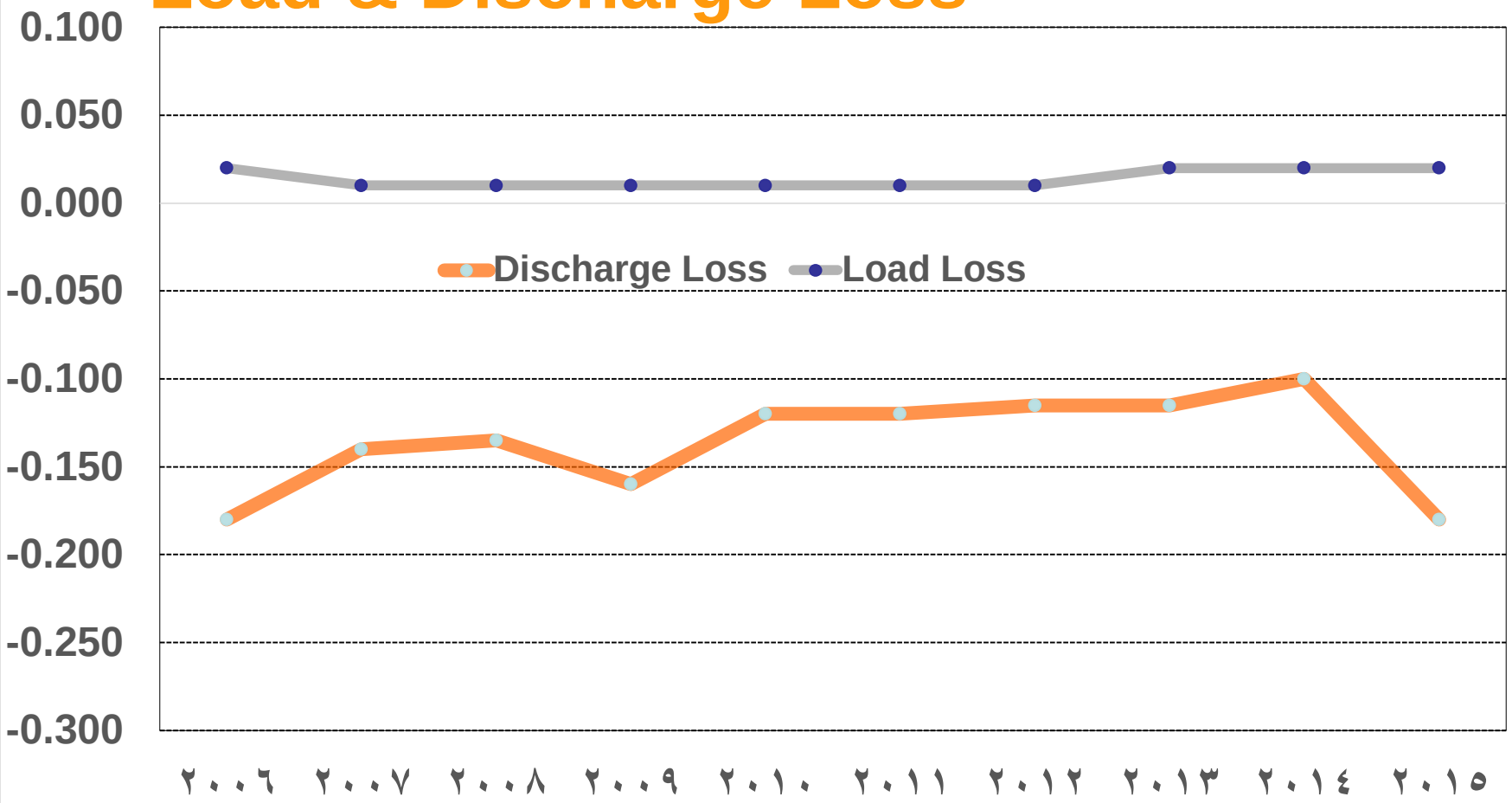




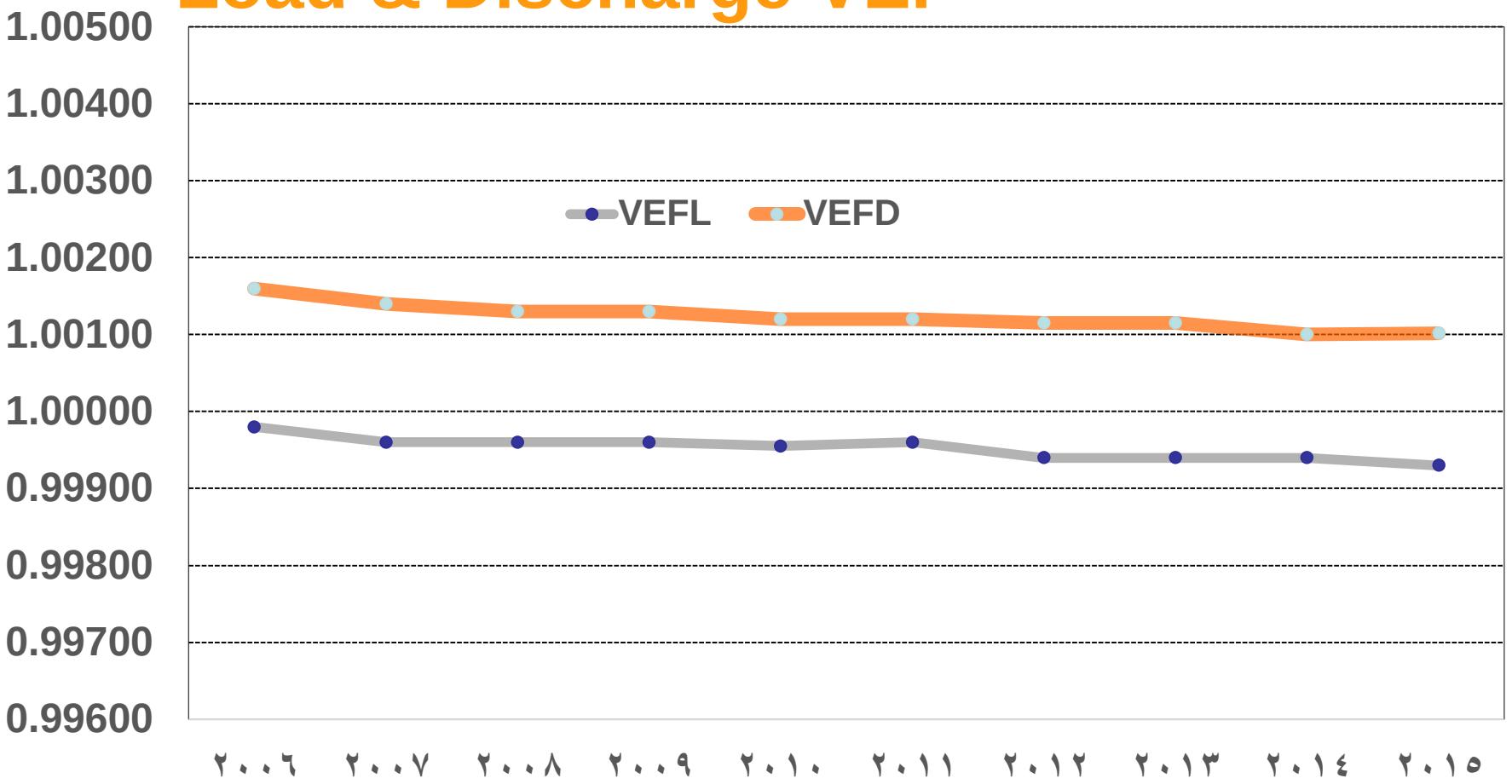
Water Difference



Load & Discharge Loss



Load & Discharge VEF



Custody Transfer Measurement

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Source of Custody Transfer Measurement

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Custody Transfer Measurement

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Tank Measurement

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Static Measurement System

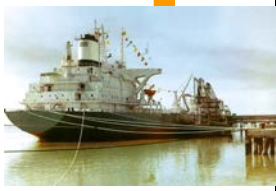
Shore Tanks

Ship Tanks

Static Measurement System

Shore Tanks

Ship Tanks



Meter Measurement

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Dynamic Measurement System

Flow-Out

Upstream Valve

Downstream Valve

Flow Meter

UPSTREAM HEADER

DOWNSTREAM HEADER

Flow-In

Dynamic Measurement System

Flow-Out

Upstream Valve

Downstream Valve

Flow Meter

Prover Valve

UPSTREAM HEADER

PROVER HEADER

DOWNSTREAM HEADER

PROVER

Flow

Flow

Detectors

Sphere

Flow

4-Way Valve

Flow

Flow

Flow

Flow Control Valve

Flow-In

Ship Measurement

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Static Measurement System

Shore Tanks

Ship Tanks

Static Measurement System

Shore Tanks

Ship Tanks

Static Measurement System

Shore Tanks

Ship Tanks

Custody Transfer Agreement

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Custody Transfer in the oil and gas industry refers to the transactions involving transferring physical properties from one party **(SELLER)** to another **(BUYER)**

All international transportation start with a **BUYER**, a **SELLER** and a sales **CONTRACT**.

Custody Transfer includes the transferring of Crude Oil and Petroleum Products between tanks and tanks, tanks and ships and other transactions.

Once the price and the specifications are agreed, then parties must agree on how to get the cargo from seller to buyer.

Both parties agree on:

- the product,
- the quality,
- the quantity,
- the ship,
- the port of delivery,
- the delivery date(s),
- the **operations procedures** for delivery,
- the documentation.

Custody Transfer procedures:

The contractual agreement for a transaction accepted method(s) for quantity and quality measurement is the Custody Transfer procedures.

Operation procedures:

Crude oil and petroleum products are usually traded in units of **volume**, at standard temperature (**60˚F** or **15˚C**) or **weight** (in **Air** or **Vacuum**).

Operation procedures:

It should also specify what **sample** will be used for custody transfer purposes and the exact **standards** for **analytical specifications** and **procedures**.

Operation procedures:

Although the custody transfer procedures are agreed, but many sales contracts do not specify a **BACKUP** measurement method(s) in term of custody transfer in the event of a problem or malfunction.

Field Information

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Measurements used for custody transfer

- Shore Tanks
- Vessel Tanks
- Meters

THANK YOU

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