Water Wash Batch (WWB) Presentation

#1
EXCO
WWB Treatment in the Crude EXCO Flow ™ technology

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#2

WWB Crude Wash

- This technology was developed due to a persistent issue in the PEMEX system.
- The salt content in the crude is considerably high when it arrives at the refinery (150-400 lb/1000 bbl).
- With current sedimentation time, it is extremely hard to reach values of 5 lb/1000 bbl to be able to process product in the desalination.
- In addition to the emulsion's formation with congenital water and cleaning water in the desalination.
- All these issues cause corrosion, soiling, high pressure in heaters, and loss of operation efficiency.
- It also presents formation of ammonium chloride and iron problems which will initiate serious soiling and corrosion issues in hydrodesulfurization plant, FCC, cookers, and heaters.

#3

WWBS Crude Wash

- The application of this treatment is necessary upon the arrival of crude oil to any refinery or distribution center.
- In preparation for the treatment the following conditions are required:
    - Conditioning of water wash (fire retardant) using compound chemicals from EXCO Flow ™
    - The salt content (lb/1000 bbls) in the crude oil, will determine the amount of water wash for conditioning.
    - Based on the infrastructure (already installed) inject the solution for a better and more efficient mixing.
    - Let it stand in standing tanks for 7 – 12 hours.
    - Drain remaining water and after verifying resulting salt values, if results are satisfying, send to stabilizing tanks.
- **With this WWBS Crude Washing technology, it is possible to lower the salt content up to a 70% less of its original arriving value.**

#4

Maya crude's pipeline testing

- Feasibility testing:
    - Asphaltene: 4 – 8% unstable
    - Paraffines: 13 – 15%
    - Water and sediments: 0.5 – 3%, 0.1 – 1%
    - Salt: 150 – 400 lb/1000 bbls
    - Acidity: 3.6 -4.3%
    - Emulsion: very consistent (it contains agglomerates and added dispersants in wells)

#5

Tanks TV-2005 and TV-2006

- Maya crude's receptor tanks testing:

	TV-2005	**TV-2006**
Asphaltene:	12.96	11.86
Paraffines:	9.75	10.92
Water and Sediments:	T:0.5, M:1.2 F:24	T:0.2, M:0.5 F:26
Salt PTB:	267-280	189-242
Acidity:	3.89	3.42
Emulsion:	Very Persistent	Very Persistent

- The tank drainage deteriorates due to the sediment accumulation and the crude water persistent emulsion in the tanks.

#6

EXCO Flow ™ Treatment

- Based on the previous data, treatment was added to arriving crude line, tank was drained, and we obtained the following results.

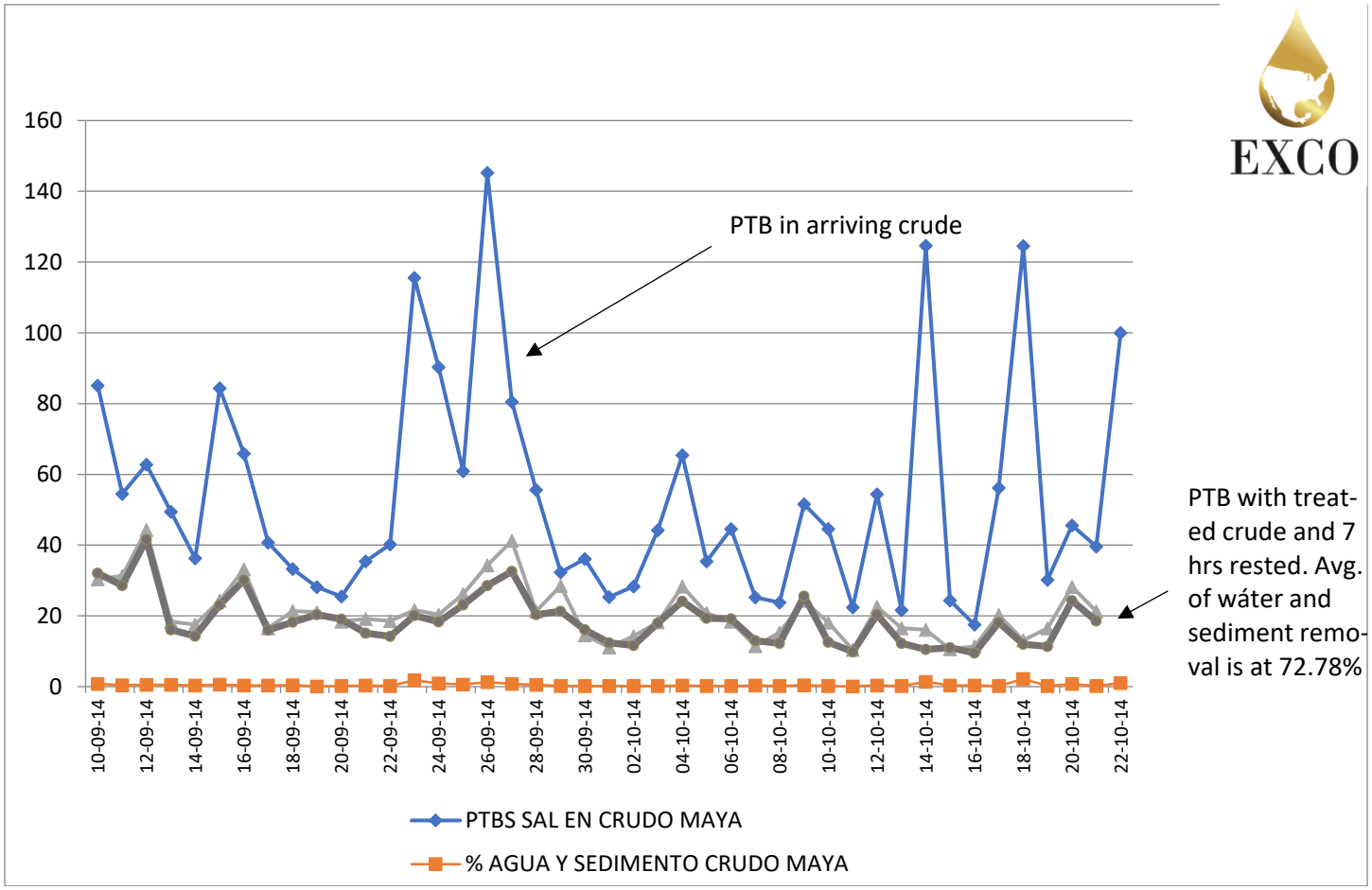
	RESTING TIME		
Salt PTB	7 hours	11 hours	18 hours
74	26	11.6	**9.2**
68	22	10.2	**9.5**
90	22.3	13.7	**11.4**

- Based on these results, we can resolve the emulsion problem and remove salt in crude up to a 74.9% in 7 hours.

#7

Salt behavior in Maya crude as it arrives at Minatitlan refinery

Lab evaluation with EXCO Flow ™ Treatment



Salt in Maya crude

Water and sediments in Maya crude

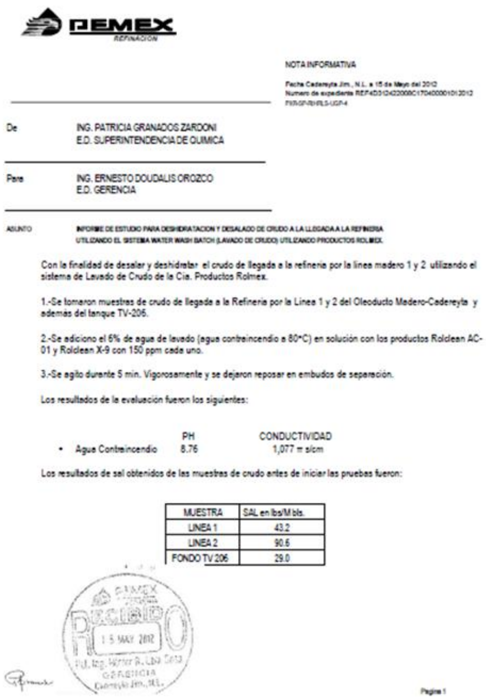
#8

WWB process flow diagram

(Insert diagram)

#9

Experimental test endorsed by Crude Wash EXCO Flow ™



NOTA INFORMATIVA

Fecha Cadereyta Jim., N.L. a 15 de Mayo del 2012
Numero de expediente REF4D312422008C17040000101 2012
FWGF-RHRLS-UGP-4

De ING. PATRICIA GRANADOS ZARDONI
E.D. SUPERINTENDENCIA DE QUIMICA

Para ING. ERNESTO DOUDALIS OROZCO
E.D. GERENCIA

ASUNTO INFORME DE ESTUDIO PARA DESHIDRATACION Y DESALADO DE CRUDO A LA LLEGADA A LA REFINERIA UTILIZANDO EL SISTEMA WATER WASH BATCH (LAVADO DE CRUDO) UTILIZANDO PRODUCTOS ROLMEX.

Con la finalidad de desalar y deshidratar el crudo de llegada a la refineria por la linea madero 1 y 2 utilizando el sistema de Lavado de Crudo de la Cia. Productos Rolmex.

1.-Se tomaron muestras de crudo de llegada a la Refineria por la Linea 1 y 2 del Oleoducto Madero-Cadereyta y además del tanque TV-206.

2.-Se adiciono el 6% de agua de lavado (agua contraincendio a 80°C) en solución con los productos Rolclean AC-01 y Rolclean X-9 con 150 ppm cada uno.

3.-Se agito durante 5 min. Vigorosamente y se dejaron reposar en embudos de separación.

Los resultados de la evaluación fueron los siguientes:

	PH	CONDUCTIVIDAD
• Agua Contraincendio	8.76	1,077 m s/cm

Los resultados de sal obtenidos de las muestras de crudo antes de iniciar las pruebas fueron:

MUESTRA	SAL en lbs/M bls.
LINEA 1	43.2
LINEA 2	90.6
FONDO TV 206	29.0

RECIBIDO 15 MAY 2012 GERENCIA Cadereyta Jim., N.L.

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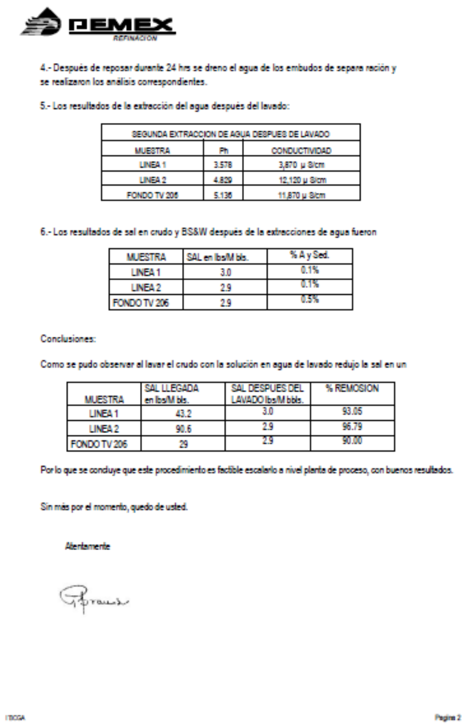

4.- Después de reposar durante 24 hrs se dreno el agua de los embudos de separa ración y se realizaron los análisis correspondientes.

5.- Los resultados de la extracción del agua después del lavado:

SEGUNDA EXTRACCION DE AGUA DESPUES DE LAVADO		
MUESTRA	Ph	CONDUCTIVIDAD
LINEA 1	3.578	3,870 µ S/cm
LINEA 2	4.829	12,120 µ S/cm
FONDO TV 206	5.136	11,870 µ S/cm

6.- Los resultados de sal en crudo y BS&W después de la extracciones de agua fueron

MUESTRA	SAL en lbs/M bls.	% A y Sed.
LINEA 1	3.0	0.1%
LINEA 2	2.9	0.1%
FONDO TV 206	2.9	0.5%

Conclusiones:

Como se pudo observar al lavar el crudo con la solución en agua de lavado redujo la sal en un

MUESTRA	SAL LLEGADA en lbs/M bls.	SAL DESPUES DEL LAVADO lbs/M bbls.	% REMOSION
LINEA 1	43.2	3.0	93.05
LINEA 2	90.6	2.9	96.79
FONDO TV 206	29	2.9	90.00

Por lo que se concluye que este procedimiento es factible escalarlo a nivel planta de proceso, con buenos resultados.

Sin más por el momento, quedo de usted.

Atentamente

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#10

Technical Proposal

- Our evaluation proposal is focused to better your operation conditions
- We propose 8 days of our WWBS in crude
- All results will always be overseen and approved by the operating personnel
- We propose to draw initial samples from arriving crude and storage tanks to determine % of water, sediment, and salt PTB with base line
- Subsequently, we will be taking samples every hour and will register amount of water drained from tank to establish a balance between congenital water, the water wash, and drained water itself
- We will provide daily reports and at the end of treatment
- We will keep all safety and environmental standards

#11

INJECTOR INSTALLATION TO ARRIVING CRUDE PIPELINE