PERMANENT AVIATION FUEL FACILITY

ANNUAL AUDIT REPORT

For

Environmental Permit
EP-262/2007/B

Prepared by ECO Aviation Fuel Services Limited
Date of Audit : 13 – 24 March 2015

Prepared By :	Tommy Yu, Health, Safety & Environmental Officer	25 March 2015
Reviewed By :	Michael Chung, Operations Manager	30 March 2015
Reviewed By :	Eddie Kwan, Facility Manager	4 April 2015
Approved By :	Tommy Siu, General Manager	20 April 2015

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Introduction

The Permanent Aviation Fuel Facility (PAFF), located on about 9.28 ha of land at Tuen Mun Area 38, consists of a tank farm, a two berth jetty and associated pipelines for receipt of aviation fuel from ships to the tank farm, and twin submarine pipelines from the tank farm to the existing pipelines located at the aviation fuel receipt facility at Sha Chau for transfer of aviation fuel from the tank farm to the Hong Kong International Airport (HKIA). PAFF was also accredited for ISO14001 and OHSAS18001.

The tank farm has eight storage tanks each providing a storage capacity of between 22,000m^3 to 35,000m^3 with a total capacity of 264,000m^3. The tank farm is provided with bund walls and a contained drainage system.

Other facilities within the PAFF include a pump platform where the pumps, filters and recovery system are located. A service and administration building houses the control room, security control, backup power generator, firefighting equipment, transformers, switch rooms, workshop and store room.

Aviation fuel is unloaded at a twin berth jetty located approximately 200 meters offshore at about 17m depth of water. The jetty was constructed on tubular piles and provides berthing for tankers with deadweight tonnage ranging from 10,000 to 80,000.

Aviation fuel is transferred to HKIA by means of twin subsea 500mm diameter pipelines connecting to the Sha Chau island custody transfer facility located at 4.4 kilometers south of PAFF. The pipeline system is protected with a cathodic protection system and equipped with a permanent leak detection system.

In summary, PAFF is a project for storage and delivery of aviation fuel to HKIA for the operational life of the Hong Kong International Airport.

Purpose and Scope

This Annual Audit reviews the performances of the design arrangements and measures mentioned in Condition 3.5 of the Environmental Permit (No. EP-262/2007/B).

In this report, there are a large number of photos and inspection records made available for review, the photos and inspection records that have been attached are representative of the facilities and/or operation process.

Conclusion

The results of this Year 2014 Annual Audit reveal that the Environmental Permit Condition 3.5 requirements are adhered.

Audit Details

Results are designated as "**C**" for conformance, "**O**" for Observation and "**NC**" as non-conformance.

1 Conditions Set Out in the Environmental Permit

1.1 Containment Systems of Aviation Fuel Storage Tank Farm

1.1.1 All aviation fuel storage tanks shall be located in bunded compounds with capacity of more than 110% of the contents of the largest aviation fuel storage tank in the bunded compounds.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "The tank farm storage consists of two bunds each designed to have six tanks, of which 4 tanks in each bund (a total of 8 tanks) have been built. The calculation of bund wall containment volume in Drawing PAFF/RJ/02/DWG/G/3015(EX) shows that the current containment capacities of each of the two bunds are 195% and 188% respectively, far greater than 110% of the largest aviation fuel storage tank in the bunded compounds. Moreover, both bunds are interconnected for the overflow so that in normal circumstances, the overall containment capacity is double the size of a single bunded compound, or greater than 300% of the largest tank for the 8 tank facility. This meets the I.P. Code Part 19 "Fire Precautions at Petroleum Refineries and Bulk Storage Installations" item 3.4.2.5.5 and the Hong Kong "Code of Practice for Oil Storage Installation" item 4.1. " There has been no change made since the completion of construction in October 2010. Photograph No. 1 shows that all eight tanks are located within bunded compounds.	**C**

1.1.2 The bunds shall be partly sunken below the level of ground outside the bunds

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "Drawings PAFF/BA/02/DWG/C/1721-1724 reflect that the bunds have been designed to be partly sunken below ground level outside the bunds in the EVA." There has been no change made since the completion of construction in October 2010. Photographs No. 2 & 3 show that both bunded areas are partly sunken below the level of ground outside the bunds.	**C**

1.1.3 Wave Deflector shall be used at the bunds

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "Drawings PAFF/BA/02/DWG/C/1721-1724 show designed installation of wave deflectors on the bund walls." There has been no change made since the completion of construction in October 2010. Photograph No. 4 shows wave deflectors at top of the bunds and properly maintained.	**C**

1.1.4 Fire-retardant joints shall be used at the bunds

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "Drawings PAFF/BA/02/DWG/C/1722-1724 show designed installation of special fire-retardant joints at the bunds. The components consist of Flexcell Compressible Filler and Nelson Fire Stop Product ES1399 Joint Sealant (capable of 4 hours of fire resistance). All visible parts of the joints are covered by stainless steel plates on the inside." There has been no change made since the completion of construction in October 2010. The external steel plates are only fixed in the phase 1a bunds. For phase 1b bunds, the steel plates are embedded in the concrete and span the construction joint. Photographs No. 5 & 6 show that visible parts of the joints are covered by stainless steel plates on the inside at phase 1a and properly maintained.	**C**

1.1.5 Intermediate bund walls shall be designed and constructed within the bunded compounds for each aviation fuel storage tanks

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- Drawings PAFF/BA/02/DWG/C/1452 & PAFF/LC/02/DWG/C/0551 show the construction of internal bund (intermediate bund) walls within the bunded compounds for each aviation fuel storage tank. It meets the I.P. Code Part 19 "Fire Precautions at Petroleum Refineries and Bulk Storage Installations" item 3.4.2.5.4."	**C**

Observation	Result
There has been no change made since the completion of construction in October 2010. Photographs No. 7 & 8 show that intermediate bund walls are complete in place and properly maintained.	

1.1.6 Two impervious security walls shall be designed and constructed outside the bunded compounds

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "Drawings PAFF/BA/02/DWG/C/1721-1724 show the construction of two impervious security walls outside the bunded compounds as the tertiary and fourth containments after the tank itself as the primary containment and bund wall as the secondary containment." There has been no change made since the completion of construction in October 2010. Photographs No. 9 & 10 show that two impervious security walls outside the bunded compounds are complete in place and properly maintained.	**C**

1.1.7 A landscaped berm of at least 1.5m high shall be designed and constructed outside the bunded compounds

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :- "Drawing PAFF/BA/02/DWG/C/1481 shows a landscaped berm of at least 1.5m high outside the outer security wall." There has been no change made since the completion of construction in October 2010. Photographs No. 11 & 12 show that a landscaped berm of at least 1.5m high outside the outer security wall is in place and properly maintained.	**C**

1.1.8 Gates at the security walls shall be properly designed and constructed to provide sealing in case of any fuel spillage within the aviation fuel storage tank farm

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawing PAFF/BA/02/DWG/C/1727 shows that solid gates at the security walls would provide sealing in case of any fuel spillage outside the bunded areas within the aviation fuel storage tank farm." There has been no change made since the completion of construction in October 2010. Photographs No. 13 & 14 show that the gates at security walls are in place and properly maintained.	**C**

1.1.9 All the bund and security walls shall be properly designed and constructed using reinforced concrete to provide sufficient structural strength to withstand any liquid surge load in case of any accidents

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawings PAFF/BA/02/DWG/C/1726, 1728, and 1730 show that all the bund and security walls are constructed by reinforced concrete to provide sufficient structural strength to withstand any liquid surge load in case of any accidents." There has been no change made since the completion of construction in October 2010. Photographs No. 15 & 16 show that all the bund and security walls are in place and properly maintained.	**C**

1.2 <u>Drainage Isolation and Lining System for Aviation Fuel Storage Tank Farm</u>

1.2.1 Drainage system shall be properly designed and constructed for the aviation fuel storage tank farm to collect aviation fuel in case of spillage.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that :	

Observation	Result
"The drainage layout plans in Drawings PAFF/BA/02/DWG/C/1452 & PAFF/LC/02/DWG/C/0551 show the construction of the drainage systems with appropriate falls and gradients to collect aviation fuel in case of spillage. It meets the Hong Kong "Code of Practice for Oil Storage Installation" item 6.2.1." There has been no change made since the completion of construction in October 2010. Photographs No. 17 & 18 show that the impervious lining is in good condition and the drainage fall to interceptor for final collection.	**C**

1.2.2 Valves and oil interceptors shall be properly designed and constructed at the drainage system to prevent any oily discharge to the sea.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "The drainage layout plans in Drawings PAFF/BA/02/DWG/C/1452 & PAFF/LC/02/DWG/C/0551 show the installation of oil interceptors and valves before the drainage outlets of bunded areas. The oil interceptors are designed to intercept and contain spillage while the valves are normally kept in close position as further precaution. They will be opened to release storm water inside the bunded areas as necessary and meet the Hong Kong "Code of Practice for Oil Storage Installation" item 7.1." There has been no change made since the completion of construction in October 2010. Photographs No. 19 & 20 show that the valves at the oil interceptors and are kept in normal-close position.	**C**

1.2.3 Impermeable lining shall be installed underneath all aviation fuel storage tanks to prevent seepage of aviation fuel to ground.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawing PAFF/BA/02/DWG/C/1705 shows the installation of impermeable lining underneath all aviation fuel storage tanks and within the bunded areas to prevent seepage of aviation fuel to the ground due to leakage from the storage tanks. This meets the I.P. Code Part 19 "Fire Precautions at Petroleum Refineries and Bulk Storage Installations" item 3.4.2.5.2. "	**C**

There has been no change made since the completion of construction in October 2010. Photographs No. 21 & 22 show construction record of the impermeable lining at various locations.	

1.3 **Overfilling Monitoring System and Leakage Detection System**

1.3.1 Tank overfilling monitoring systems shall be properly designed and constructed for the Project.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "The calculations in appendix 2 reflect the setting of the high and high-high levels alarms for each storage tank. The high level alarm has been set by means of the level gauge of each tank and will trigger an alarm by the SCADA system for operations alert. The high-high level alarm has been designed to mitigate the reliance on one single system of which a vibrating fork type level switch, was installed for detecting the high-high level and would trigger an Emergency Shutdown for all tank inlet valves and the stop all pumps immediately with an audible alarm to operation personnel." There has been no change made since the completion of construction in October 2010. PAFF performed regular inspection on the functionality of the level alarms with records kept in the maintenance system. Photographs No. 23, 24 & 25 show that the high level alarm setting in the SCADA system, the regular testing on the high-high level alarm and the testing record of the High-High level alarm.	**C**

1.3.2 Pipeline leakage detection system shall be properly designed and constructed for the Project.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawings PAFF/LC/01/DWG/M/0202-3 & 0207 show the installation of pipeline leakage detection system in the subsea pipelines using COWI Stat Leak System. The test is by closing the sections of pipelines and by detecting pressure drop within a specified time period inside the pipeline. A pressure drop not due to thermal effect may indicate a possible leak in the pipeline and will generate an alarm for immediate investigation.	**O**

The COWI Stat Leak System instrumentation has been installed and there has been minor design change after the completion of construction in October 2010. Photograph No. 26 shows the COWI Stat Leak System software has been installed on the computer. The system enhancement of the leak detection system pump and piping are in progress and pending for final integrated commissioning and automatic sequencing.	

1.3.3 Impermeable lining leakage detection system shall be properly designed and constructed for the Project.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawing PAFF/BA/02/DWG/C/1705 shows the installation of 80mm diameter leak detection pipe in accordance with API 650 underneath the sump of each storage tank. The head of the pipe is perforated and designed to situate above the containment membrane of the tank base with the pipe descending to the end outside the tank ring base, ensuring the pipe will collect and drain out fuel, if any, to a designated containment well at the tank side. Therefore, any leakage from the bottom of the storage tank would be detected and the bunded areas are laid with impervious membrane to contain fuel spillage. The construction of this design has been implemented for all tanks." There has been no modification made since the completion of construction in October 2010. Photographs No. 27 & 28 show the tell-tale pipe installed and the as-built fuel collection chamber.	**C**

1.3.4 Emergency shutdown (ESD) systems shall be properly designed and constructed for the Project. All ESD systems shall be equipped with manual initiating devices.

Observation	Result	
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawings PAFF/KG/02/DWG/E/7437 & PAFF/LC/03/DWG/M/0251 show the installation of manual-operated emergency shutdown (ESD) buttons at the strategic points in the tank farm and on the jetty for emergency use. As soon as ESD is activated, all valves and delivery pumps will shut down automatically to isolate the fuel lines and stop fuel flow. The installation of ESD is in place."		**C**

There has been no change made since the completion of construction in October 2010. Regular inspection was performed on the ESD functionality with records kept in the maintenance system. Photographs No. 29 & 30 show the regular testing on the ESD system and the testing record.		

1.3.5 The ESD system shall be initiated automatically in case of actuation of fire alarm system, overfilling monitoring system of aviation fuel storage tanks and leakage detection system of sub-sea pipelines.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawings PAFF/LC/01/DWG/M/0202 – 0203 & 0207 show the installation of ESD system which will be triggered automatically in case of actuation of fire alarm system, overfilling monitoring system of aviation fuel storage tanks and leakage detection system of sub-sea pipelines. The installation work has been completed." There has been no design change made since the completion of construction in October 2010. PAFF perform regular inspection on the functionality of the ESD interaction with records kept in the maintenance system. Photographs No. 31, 32, 33 & 34 show the regular testing on the ESD interaction and the testing record.	**C**

1.4 **Installations at the Jetty**

1.4.1 The jetty shall be installed with defensive fenders.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Besides the fender system engineered to suit the full range of vessel sizes and types expected to use the berth, drawings PAFF/MA/03/DWG/C/2807-2808 show the installation of defensive fenders on the shore side of the jetty and end protection units to protect against possible collision from small craft straying into the area. The installation of the fenders has been completed." There has been no change made since the completion of construction in October 2010. Photographs No. 35, 36 & 37 show that the fender system installed both at sea side and shore side of the jetty.	**C**

1.4.2 The jetty shall be installed with coupling points with slop collection utilities connecting to oil interceptors.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawing PAFF/LC/03/DWG/M/0251 shows the provision of oil interceptors and bunded areas to contain any dripping from the coupling equipment after disconnection from the ships and the minor spill will go into the slop collection utilities connecting to the oil interceptors. On the other hand, coupling points on the vessels would be provided with slop trays to catch minor spills of aviation fuel during coupling and decoupling. The installation work has been completed." There has been no modification made since the completion of construction in October 2010. Photographs No. 38 & 39 show that the slop trays were used to catch minor spills of aviation fuel during coupling and de-coupling.	**C**

1.5 **Sub-sea Pipelines Protective Measures**

1.5.1 The sub-sea aviation fuel transfer pipelines shall be properly designed and constructed to prevent or minimize any damage or leakage risk. The sub-sea pipelines shall be protected in accordance with the arrangement as shown in Figure 5 of the Environmental Permit No. EP-262/2007/B. The sub-sea pipelines shall be buried at least 3m below the seabed level and covered with protective armour rock layer of at least 1.2m thick. No protective armour rock layer shall be protruded above the seabed.

Observation	Result
It was confirmed in the last Design Audit Report dated October 2010 that : "Drawing PAFF/LC/04/DWG/C/0408 shows the sub-sea pipelines in accordance with the arrangement as shown in Figure 5 of the Environmental Permit No. EP-262/2007/B. The sub-sea pipelines have been installed in a dredged trench and have been buried at least 3m below the seabed level and covered with protective armour rock layer of at least 1.2m thick. The protective armour rock layer does not protrude above the seabed. The installation work has been completed. There has been no change made since the completion of construction in October 2010. According to the latest hydrographic survey result in February 2015 (attached in Appendix 4), there is no evidence of damage to our rock-fill protection layer covering the pipelines.	**C**

Appendices

Appendix 1 – The Auditor – Mr. Tommy HY Yu

Tommy is the Health, Safety & Environmental Officer with EAFS and responsible for areas covering occupational safety, plant safety, environmental monitoring and system compliance. Tommy joined ECO Aviation Fuel Services Limited in April 2014 at the Permanent Aviation Fuel Facility (PAFF).

Tommy is a Registered Safety Officer (RSO) and had held various HSE related positions in the chemical industry and petroleum industry in the past five years.

Appendix 2 – Level Alarms Settings for Each Storage Tank

Tank Detector Level and Fill Level Work Sheet

Facility : Permanent Aviation Fuel Facility, Area 38
Tank No. : Tank No. 2, 4, 5, 6, 8 and 11 (43.5m diameter)
Location : Area 38, Tuen Mun
Code : Shell document: Storage Tank Level Instrumentation Systems "Recommended Engineering Practice"
Prepared By : Leighton Contractors (Asia) Limited
Date : 4 December 2008

I. Background Information

1. Maximum fill rate = 3,500 m^3/ hr (A)

Minimum Response time
(i)High High Level to Overfill Level = 15 minutes (B)
(ii) High Level to High High Level = 10 minutes (C)

3. Minimum Fill level (Suction head limits for pump referred to the Steady State Analysis, Mar 08) = 1.5m (D)

II. Detector and Fill Level Setting

1. Volume (Depth mm) received during Response Time
(i) 15minutes = 875 m^3 (589mm) (E)
(ii) 10minutes = 583 m^3 (392mm) (F)

2. Maximum Capacity (Gross Volume) = 36,708 m^3 (G)
Overfill Level = 24.7 m (H)

3. Capacity at High-high Level = (G) – (E)
= 35,833m^3 (I)
High-high Level = 24.111 m (J)

4. Capacity at High Level = (I) – (F)
= 35,250 m^3 (K)
High Level = 23.719 m (L)

5. Capacity at Normal Fill Level = (K) – (F)
= 34,667 m^3 (M)
Normal Fill Level = 23.327 m (N)

6. Minimum Capacity = 2,229 m^3 (O)
Minimum Fill level (Suction head limits for pump) = 1.5 m (P)
Top of the Floating Suction Arm Level = 0.718m (Q)

7. Capacity at Low-low Level (Minimum Capacity) = 2,229 m^3 (R)

Leighton Contractors (Asia) Limited
Permanent Aviation Fuel Facility, Area 38 (H2104)
Tank Detector Level and Fill Level Work Sheet

Low-low Level (Suction head limits for pump) = 1.5 m (S)

8. Capacity at Low Level

100mm (1.65minutes) above the suction head limits for pump) = 1.539 m^3 (T)

Low Level = 1.60m (U)

Appendix 3 – Photos No. 1 to 39

(1) All eight tanks are located within bunded compounds

(2) Phase 1a bunded compound is partly sunken below the level of ground outside the bunds

(3) Phase 1b bunded compound is partly sunken below the level of ground outside the bunds

(4) Wave deflector provided at top of the bunds

(5) Visible parts of the joints are covered by stainless steel plates on the inside at phase 1a bund

(6) Maintenance works have been performed on sealant at joints

(7) Intermediate bund walls are provided in place near T-01-002

(8) Intermediate bund walls are provided in place near T-01-002

(9) Two impervious security walls are provided outside the bunded compounds

(10) Two impervious security walls are provided outside the bunded compounds

(11) Landscaped berm is maintained at least 1.5m high

(12) Landscaped berm is maintained at least 1.5m high

(13) Gates at security walls with sealant are maintained in good condition

(14) Gates at security walls with sealant are maintained in good condition

(15) This shows the thickness of the security wall provided

(16) This shows the thickness of the bund wall provided

(17) Impervious lining are maintained in good condition

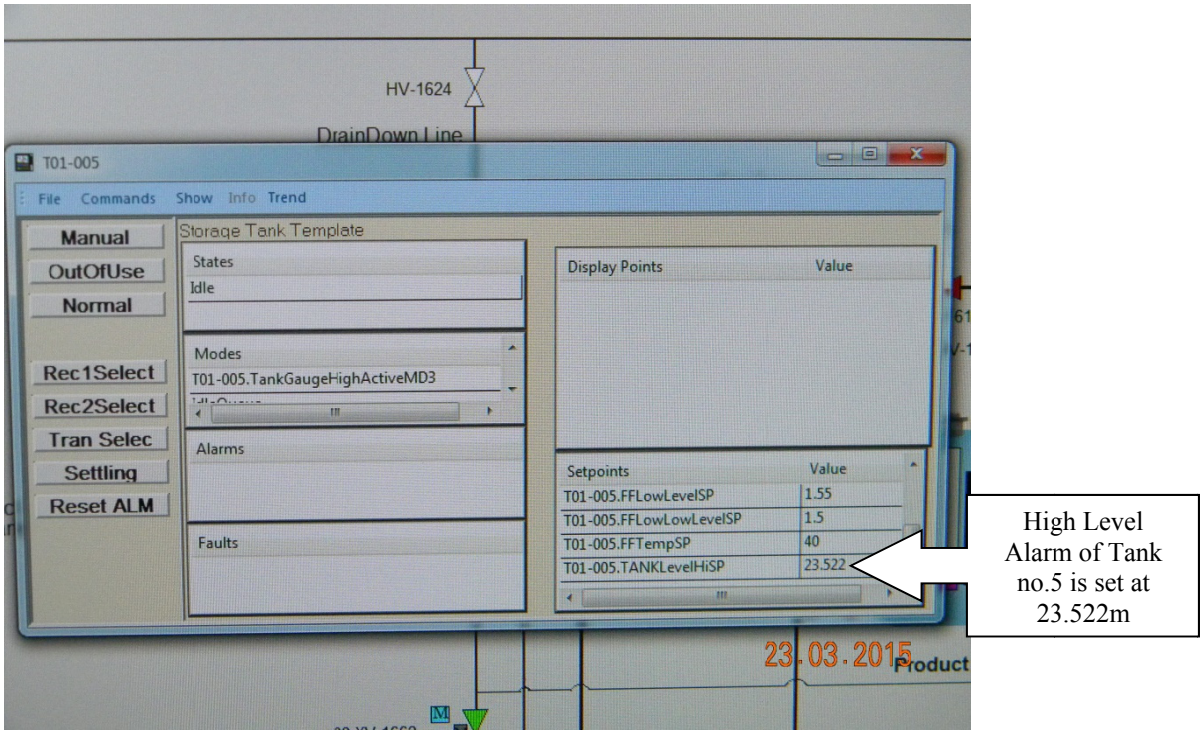
(18) Tank farm is with appropriate gradient and the drainage falls to interceptor for collection

(19) Outlet valve provided for Phase 1a Interceptor with instruction sign to keep "normally closed"

(20) Outlet valve provided for Phase 1b Interceptor with instruction sign to keep "normally closed"

(21) Record photo shows impervious membrane being installed on top of tank foundation

(22) Record photo shows imperious membrane laid at tank center sump with tell-tale pipe embedded for leak detection



(23) High Level Alarm being set in the SCADA System

(24) Regular inspection performed on overfilling monitoring device (HH Level Alarm)

Aviation Fuel Facility — ECO Aviation Fuel Services Ltd

Operation Surveillance Form

Tank No.		**T–01–002**			
			Compliance √		
Item No	**Item**	**Acceptance Criteria/Ref. Standard**	**Yes**	**No**	**Note Fault & Rectification Completed/Action Required.**
4.0	**Fire Protection**				
4.1	Cooling sprays & deflector plates	Any blockage with debris or any visible corrosion?		✓	
4.2	Base foam injection valve	Is the valve open?	✓		
4.3	Top foam pourer	Are there any signs of corrosion or Blockage to the pourer, aerator or supply piping? Are pipe brackets to tank secure?	N/A		
5.0	**Overfill Protection**				
5.1	Independent hi-hi level alarm	Does the alarm operate correctly?	✓		
5.2	Tank hi level alarm	Does the alarm operate correctly?	✓		
6.0	**Other**				
6.1	Floating Suction	By using the position indicator to confirm the floating suction free to operate?	✓		
		Are position indicator cable effectively bonded to tank shell?	✓		
		Check and record the electrical continuity readings between position indicator cable to tank shell.	✓		
		Are lifting cable bonding wires fitted correctly and free from damage.	N/A		
6.2	Auto Level Gauges	Is the Auto-level gauge functioning? Is the Temperature device functioning? Are the still pipe bellows or fittings in good Condition? Is all cabling in good Condition?	✓		
6.3	Bund	Is the bund valve closed and free to operate? Is the bund area sound?	✓		

Surveillance conducted by:	Surveillance form reviewed by:
Name: Chan Kan John	Name: Loo Siew Pang
Signature:	Signature:
Function: Terminal Technician	Function: Maintenance Engineer

3.1.1 Vertical Tank Monthly Inspection Form

(25) Record for regular inspection performed on overfilling monitoring device (HH Level Alarm)

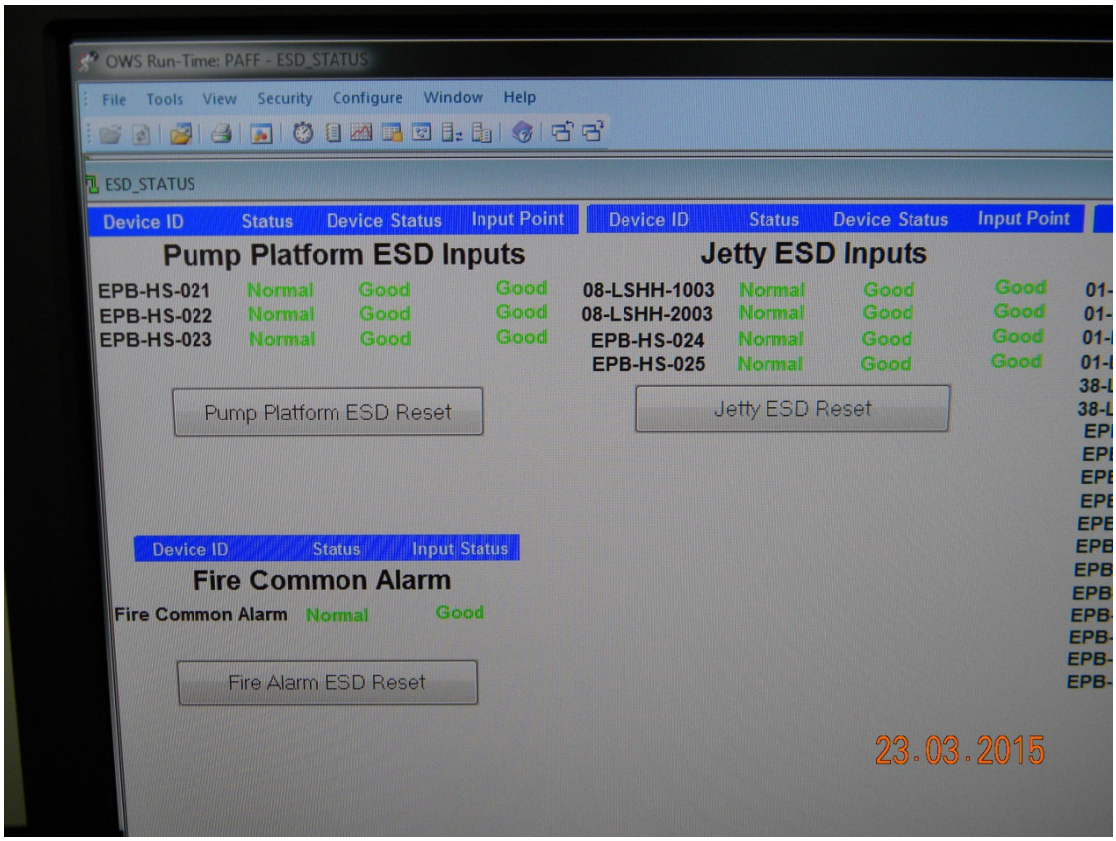
(26) Leak detection “COWI Stat Leak System” installed into computer

(27) Leak detection tell-tale pipe underneath the storage tank opening out to a collection chamber

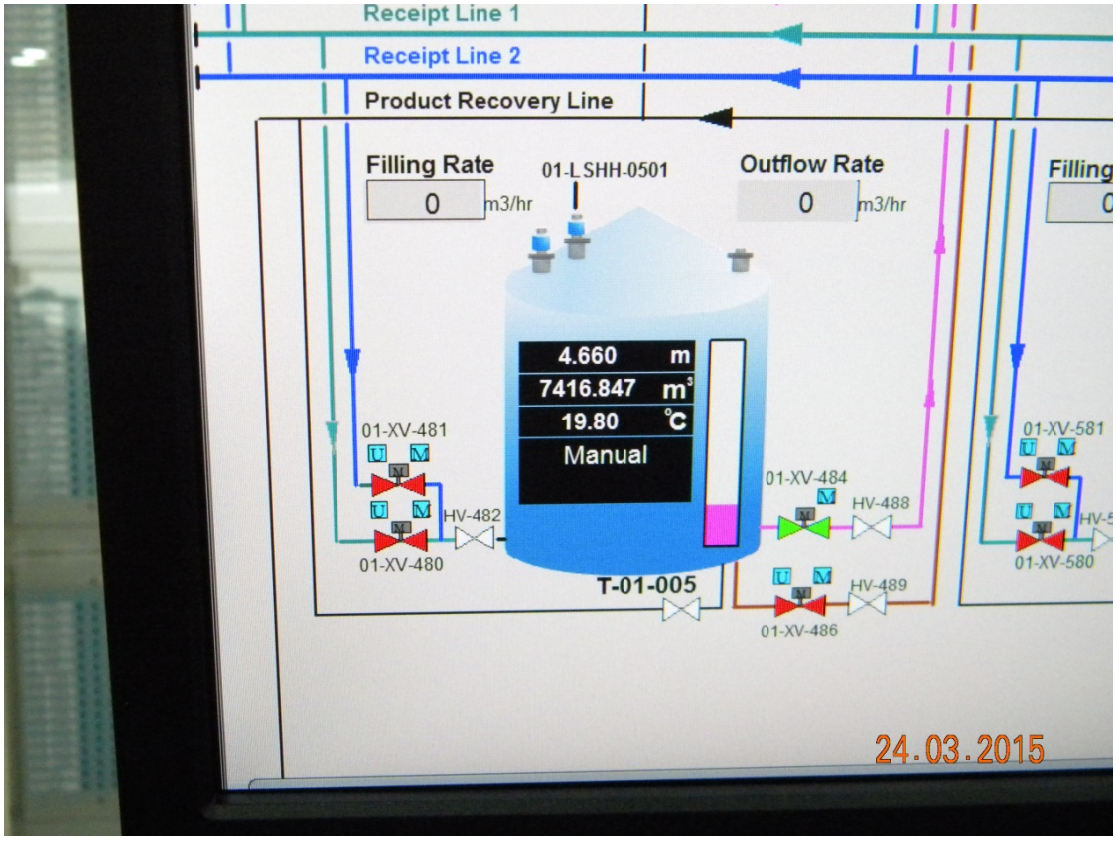
(28) Collection chamber located adjacent to tank foundation is maintained in good condition with periodic inspection

(29) ESD is maintained in good condition and being tested periodically

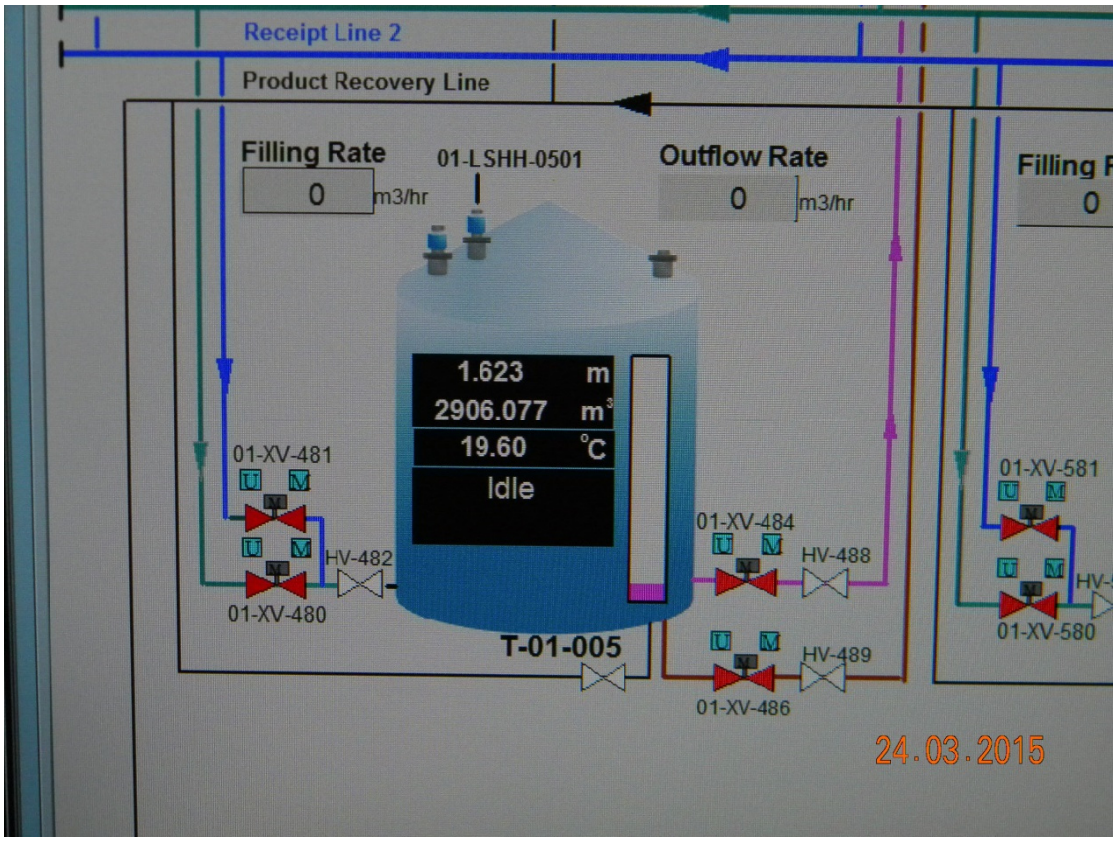
(30) The ESD regular test shown in SCADA System



(31) The ESD regular test shown in SCADA System



(32) The ESD test signal shown in SCADA System



(33) Once the system received ESD test signal, the valves will close automatically and shut down the operation shown in SCADA System

PAFF Emergency Shutdown Devices (ESD) Testing Report

Pump Platform ESD Inputs

Device ID	Task	Condition
EPB-HS-021	C/R	N/F
EPB-HS-022	C/R	N/F
EPB-HS-023	C/R	N/F

Jetty ESD Inputs

Device ID	Task	Condition
08-LSHH-1003	C/R	N/F
08-LSHH-2003	C/R	N/F
EPB-HS-024	C/R	N/F
EPB-HS-025	C/R	N/F

Tank Farm ESD Inputs Phase 1A

Device ID	Task	Condition
38-LSHH-3003	C/R	N/F
38-LSHH-4003	C/R	N/F
EPB-HS-004	C/R	N/F
EPB-HS-006	C/R	N/F
EPB-HS-007	C/R	N/F
EPB-HS-009	C/R	N/F
EPB-HS-010	C/R	N/F
EPB-HS-011	C/R	N/F
EPB-HS-012	C/R	N/F
EPB-HS-026	C/R	N/F
EPB-HS-028	C/R	N/F
EPB-HS-031	C/R	N/F
EPB-HS-033	C/R	N/F
EPB-HS-035	C/R	N/F

Tank Farm ESD Inputs Phase 1B

Device ID	Task	Condition
EPB-HS-036	C/R	N/F
EPB-HS-013	C/R	N/F
EPB-HS-014	C/R	N/F
EPB-HS-015	C/R	N/F
EPB-HS-016	C/R	N/F
EPB-HS-017	C/R	N/F
EPB-HS-018	C/R	N/F
EPB-HS-019	C/R	N/F
EPB-HS-020	C/R	N/F

Status Definitions : C = Check, R = Repair/Replace, N = Normal, F = Failure

Company Name: ECO Aviation Fuel Services Limited Location: Permanent Aviation Fuel Facility

Test Performed: Pong Hoi Yin Signature:

Date: 7/3-2015

(34) Record for regular testing performed on ESD device

(35) Fenders installed at sea side of the jetty

(36) Fenders installed at sea side of the jetty.

(37) Fenders installed at shore side of the jetty

(38) Slop trays being used for coupling and de-coupling of the loading arms

(39) Slop trays being used for coupling and de-coupling of the loading arms

Appendix 4 - Seabed Level Survey Result

John Barrett & Associates Ltd.
Authorised Land Surveyors

Land – Hydrographic – Laser Scanning

Unit E6
7/F Wah Lok Industrial Centre
31-35 Shan Mei Street
Sha Tin, NT
Hong Kong

Tel: 2358 3452
Fax: 23583452
E-mail: enquiries@jba-surveys.com
www.jba-surveys.com

Aviation Fuel Facility Submarine Pipelines
Report for Hydrographic Survey

The Project

The Aviation Fuel Facility offshore facilities include twin submarine pipelines running from Tap Shek Kok to Sha Chau and from Tap Shek Kok to the nearby off-loading jetty. The pipelines are protected by a minimum of 3 metres of rockfill cover.

Scope of Works

The objective of the hydrographic surveys was to determine the condition of the rockfill cover to the submarine pipelines and to assess any damage caused by anchoring, fishing activities or any other means. The last survey was carried out in January 2014 and the first survey was carried out in 2007 before construction works.

Methodology

A dual-frequency (38/200kHz) precision hydrographic echo sounder was used to survey the seabed. The equipment was mounted on the survey vessel using an over-the-side mount fixed midships. Navigation data was input directly into the logging software from a Differential GPS mounted directly over the echo sounder.

Bathymetric surveys were carried out to show seabed levels and levels of fill over the pipelines and around the jetties. Contour plots have been produced for use in determining the extent of any siltation or damage which may have occurred.

Surveys conducted above the pipelines to give seabed levels were carried out at 25m spacing of lines perpendicular to the direction of the pipeline routes and extending 50m each side of the pipe centre-lines. Five nos. check lines were also run parallel to the direction of the pipe routes with one line run along the centre-line and one each at 15m and 30m each side. Maximum vessel speed was 5 knots and soundings were recorded at a minimum of one every second. A total of approximately 1.1 million soundings were recorded for each frequency

Bar checks were conducted before and after each survey to determine the Velocity of Sound and the Transducer Draft. The correction data from the Bar Checks were input into the logging software before the commencement of each survey.

High frequency data (200kHz) from the echo sounder was used to determine the seabed levels, although data from both frequencies was recorded and archived.

John Barrett MNZIS MHKIS ALS Robert Schermuly MRICS MHKIS RPS(LS)

Survey Periods

The survey was carried out over two days, 24th & 25th February 2015.

Tuesday 24th February 2015
Winds: North Easterly force 3
Sea-State: Calm near-shore (Tap Shek kok & Sha Chau, max, 0.5m wave height in Urmston Road

Wednesday 25th February 2015
Winds: North Easterly force 3
Sea-State: Calm near-shore (Tap Shek kok & Sha Chau, max, 0.5m wave height in Urmston Road

Equipment

Kongsberg EA400 Dual Frequency Single Beam Echo Sounder
Hypack Navigation and Surveying Software
Trimble SPS351 DGPS System
InRoads SelectCAD Software
AutoCad Software

Vessel

A motorized vessel of opportunity was used for the surveys. The vessel was boarded each day at 8am at Marina Gardens Tuen Mun. The equipment was installed and checked on site. The boat driver was experienced in hydrographic surveying works and was familiar with the Hypack navigation user interface.

Personnel

All works were carried out by experienced and qualified personnel (1 surveyor & 1 technician).

Safety

Before work each day the safety equipment on board the boat was checked. This equipment included life-jackets, life-buoys, whistles and lights. A safety talk was conducted prior to commencement of the works.

John Barrett MNZIS MHKIS ALS Robert Schermuly MRICS MHKIS RPS(LS)

Deliverables

Reports in DWG and PDF formats and endorsed by a Chartered Surveyor:

- Seabed bathymetric data with soundings shown at a 25m grid and contours at 1m intervals
- Long section showing the original seabed profile (2007), the current seabed profile and the as-laid position of the pipes
- Cross-sections at 50m intervals showing the original seabed profile (2007), the current seabed profile and the as-laid position of the pipes
- Written survey summary in PDF format

Results & Conclusions

The survey results have been plotted in a manner to be directly comparable with previous survey data, specifically the initial survey of the seabed carried out before commencement of construction works for the installation of the submarine pipelines in 2007.

The results, shown as contour plots, cross-sections and long-sections do not show any evidence of damage or major disturbance to the rockfill protection layer covering the pipelines. The current seabed bathymetry is similar to the original seabed profile (2007) and also to the last survey carried out in 2014.

END OF REPORT

Signed:

Robert Schermuly
MRICS MHKIS RPS(LS)

John Barrett MNZIS MHKIS ALS

Robert Schermuly MRICS MHKIS RPS(LS)

Appendix 5 – Drawings

List of Drawings

PAFF/BA/02/DWG/C/1452
PAFF/BA/02/DWG/C/1481
PAFF/BA/02/DWG/C/1705
PAFF/BA/02/DWG/C/1721
PAFF/BA/02/DWG/C/1722
PAFF/BA/02/DWG/C/1723
PAFF/BA/02/DWG/C/1724
PAFF/BA/02/DWG/C/1726
PAFF/BA/02/DWG/C/1727
PAFF/BA/02/DWG/C/1728
PAFF/BA/02/DWG/C/1730
PAFF/KG/02/DWG/E/7437
PAFF/LC/01/DWG/M/0202
PAFF/LC/01/DWG/M/0203
PAFF/LC/01/DWG/M/0207
PAFF/LC/02/DWG/M/0266
PAFF/LC/02/DWG/C/0340
PAFF/LC/02/DWG/C/0551
PAFF/LC/02/DWG/M/0875
PAFF/LC/03/DWG/M/0251
PAFF/LC/04/DWG/C/0408
PAFF/MA/03/DWG/C/2807
PAFF/MA/03/DWG/C/2808
PAFF/RJ/02/DWG/G/3015(EX)