Foreword

Ethiopia as a signatory to the Convention on International Civil Aviation (Chicago 1944) and a founding member of the International Civil aviation Organization (ICAO) In line with Article 26 of the Convention, the Ethiopian Government launched an investigation into the accident that occurred to an AN-28 type aircraft registered UP-A2508, flight No- EWZ 1149 owned and operated by "JSC East Wing". The Ethiopian CAA appointed an Investigation Committee (IC) and an Investigator in Charge (IIC). The State of Design & Manufacturer, Registry and Operator invited to appoint accredited representatives to the Investigation Committee.

In accordance with Annex 13 to the Convention and with the Ethiopian Accident investigation Regulation, the investigation is not to apportion blame, or to assess individual or collective responsibility.

Consequently, the sole objective of this investigation to this accident is to establish what happened, to analyze how and why the occurrence took place, and from this analysis to determine what the occurrence reveals about the safety health of the aviation system. Such information used to arrive at conclusions and make safety recommendations aimed at drawing lessons from what happened in order to prevent similar reoccurrences, and where appropriate, to increase the overall safety of the aviation system.

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Abbreviations

AABIA	Addis Ababa Bole International Airport
ACC	Area control center
AIB	Accident investigation Bureau
ATC	Air Traffic Control
ATPL	Airline Transport Pilot License
CPL	Commercial Pilot's License
CVR	Cockpit Voice Recorder
DGCA	Directorate General of Civil Aviation
BUR	Flight Data Recording unit
ECAA	Ethiopian Civil Aviation Authority
ICAO	International Civil Aviation Organization
IIC	Investigator in Charge
JSC	Joint stock company
NLG	Nose Landing Gear
N/AP	Not applicable
N/AV	Not available
PIC	Pilot in Command
P/N	Part Number
RCC	Rescue Coordination Centre
SAR	Search and Rescue
S/N	Serial Number
TBO	Time Between Overhaul
TSN	Time Since New
TSO	Time Since Overhaul
UTC	Universal Time Coordinated

AIRCRAFT ACCIDENT INVESTIGATION REPORT

AN-28 (UP-A2805)

January 20, 2014

Synopsis

Date of accident: 20.01.2014	**Aircraft: AN-28**

	Registered: UP-A2805
Site of accident: N008°59'18" E038°47'60" Near Addis Ababa Bole Air Port	**Owner:** JSC "East Wing", Shimkent, Kazakhstan
Type of flight: Ferry Flight	**Operator:** JSC "East Wing", Shimkent, Kazakhstan
	Persons on board: 3

Injuries	**Crewmembers**	**Passengers**	**Others**
Fatal	None	None	None
Serious	None	None	None
Minor	3	None	None

Executive Summary

On January 20, 2014, a Kazakhstan registered passenger transport aircraft Type and model AN-28, Registration Mark UP-A2805, owned and operated by JSC "East Wing" was ferry flying from Uganda to Yemen, overflying the air space of Ethiopia (Addis Ababa Bole International Airport)

The aircraft took off with two flight crew (Captain, first officer) and one ground mechanic loading on board some aircraft spare parts and ground support equipment. After flying for 4 hrs and 30 min along the route approximately at 07:00 UTC both engines surged and flamed out consequently with 15 min difference forcing the captain to make force landing on the available ground surface.

At about 07:30 UTC, the control tower informed AIB about the crash of the aircraft near a place called Legedadi (district of Berek) east of Addis Ababa.

The aircraft crash landed on a relatively flat ground surface causing minor injury to the crews and mechanic. As soon as the crash heard, the Ethiopian Civil Aviation Authority Search and Rescue operation quickly deployed to the crash site. In collaboration with Ethiopian Air force and district of the accident zone, the local people and police around the area highly assisted the crew to evacuate from the crashed aircraft.

Subsequently, all the three crews rescued by Ethiopian Air force and brought to Addis Ababa Bole International Airport, and taken to Balcha Hospital with Ambulances. The aircraft substantially damaged. There was no fire following the accident.

Organisation of the investigation

On 20 January 2014 at around 07.30 UTC, the Ethiopian AIG was informed about the disappearance of the aircraft from the radar screen while overflying Addis Ababa after departing from Uganda and destine to Yemen. The aircraft found crashed near the place called Legedadi east of Addis Ababa.

After *it* was confirmed that the air raft has crashlanded, the Ethiopian CAA launched a technical investigation team in parallel with the search and rescue operation. In accordance with article 26 of the Convention and ICAO Annex 13 "Aircraft Accident and Incident Investigation", an Investigation Commtte was formed by Ethiopian CAA in order to conduct the technical investigation. An investigator-in-charge (IIC) was also designated to lead and initiate immediately the investigation. As per Annex 13 provisions the notification of the accident was released and the Kazakhstan civil aviation commuitte, as state of Operator and Registry, was invited to appoint an accredited représentative to be associated with the IC.

1. Factual Information

1.1 History of the Flight

On January 20, 2014, Kazakhstan registered aircraft Type and Model AN- 28, Registration Mark UP-A2805, owned and operated by JSC East Wing was performing a special ferry flight from Uganda via Addis Ababa to Yemen over flying the air space of Ethiopia bypassing Addis Ababa Bole International Airport.

After takeoff the aircraft performed normal flight for about 4:30 hrs. After flying for about 4:30 hrs , around the flight region of Addis Ababa the right engine surged and flamed out. The captain informed the ATC of AABIA about the emergency and diverted the aircraft to the airport for emergency landing. After flying for about 15 minutes left engine similarly surged and flamed out at about 15 km short of the run way. Having no means of controlling the aircraft, the captain decided to make force landing on the selected from the air ground surface and touched the ground normally. During the landing run over the rough ground surface, an obstacle of a high ground hit the nose gear, which was broken and retracted in to the cockpit by piercing its floor. The aircraft continued moving forward with its nose fuselage belly during which it killed three cattle and the aircraft substantially damaged. All the two crews and one mechanic rescued safely with minor injuries.

1.2 Injuries to Persons

Injuries	Crew members	passengers	Others
Fatal	-	-	-
Serious	-	-	-

Minor	3	-	-

1.3 Damage to Aircraft

The aircraft suffered with substantial damages. The left and right wing roots detached from the fuselage, both wing tips damaged by the impact with the cattle and the ground. Nose and right main landing gears are broken. The impact of the aircraft nose with the ground damaged the crew cabin and forward part of the fuselage belly. Lower frame elements of the nose fuselage and cabin floor destroyed. The tail fuselage, vertical fin, rudders, elevators and the central part of the wings remained un- damaged.







Fig -1 Major structural parts of the aircraft damaged due to impact with ground obstacles

1.4 Other Damage

Two cows and one ox killed during the crash land run

1.5 Personnel Information

The flight crew consisted of the captain, first officer as well as one ground mechanic.

1.5.1 Pilot–in-command:

Sex ……. Male
Age…….... 55
ATPL number……TA № 004689
Issued by ……...Aviation Transport of Ukraine
Medical expiry date……21.08.2014
Total flight hours…….....13000
On type ……..10500
Last flight…….4:45 hrs

1.5.1.2 First officer:

Sex ……. Male
Age…….. 42
ATPL number……CA № 008089
Issued by ……...Aviation Transport of Ukraine
Medical expiry date……07.06.2014
Total flight hours…….. 1022
On type……. 160
Last flight…….4:45 hrs

1.5.1.3 Ground mechanic:

Sex ……..... Male

Age …….. 57

License number…… GE № 00086

License valid until…… 05.12.2010

1.6 Aircraft Information

The aircraft was manufactured in Poland by PZl MELEC Company. It was registered in Kazakhstan. Certificate of Airworthiness for special flights No 233 issued by Kazakhstan Civil Aviation committee on 09-01-2014 and valid until 23-01-2014.

1.6.1 Airframe

Manufacturer	"PZL MELEC" , POLAND
Type	AN-28 (passenger)
Serial number	1AI008-22
Date of manufacture	Oct 09 ,1990
Life limits	3000hrs,4000 landings,23 yrs
State of registration	Kazakhstan
Registration	UP-A2805
Certificate of Airworthiness Valid until	№ 233 (for special flights) January 23,2014
Time since new	1539
Number of repairs	No

1.6.2 Engine # 1 Left

Manufacturer	OMKB
Manufactured	21.09.88
Engine Type	TVD-10B
Serial number	K028801006
Time since new	1264hrs (As of 10.08.2012)
Time since overhaul	NO

1.6.3 Engine # 2 Right

Manufacturer	OMKB
Manufactured	21.08.90
Type	TVD-10B
Serial number	291902020
Time since new	1822 hrs
Time since overhaul	292 hrs

1.6.4 Propeller left

Manufacturer	
Manufactured	25.04.90
Type	AV-24AH
Serial number	J050085
Time since new	1442
Time since overhaul	No

1.6.5 Propeller right

Manufacturer	
Manufactured	25.04.90
Propeller Type	AV-24AH
Serial number	J050084
Time since new	1442
Time since overhaul	NO

1.6.6 Aircraft fuel system

The type of fuel used is Jet A-1.The fuel system consists of two wing fuel cells in each half wing, one in board and one out board. The out board fuel cells feed the engines. The out board fuel cells in each half wing are interconnected by valve for fuel transfer when difference in quantity appears in each half wing beyond the acceptable limit. Two auxiliary fuel tanks modified and installed in the passenger cabin floor, interconnected with each other and with the inboard wing cell of the right wing. Fuel from the auxiliary tanks is pumped to the right wing in board cell by a transfer pump manually and as necessary. During the investigation, the left wing cells found empty. The lid of the left out board fuel cell filling cup found lost. At the same time, the right wing in board cell was also empty while the out board found with some fuel but dirty and impure. The auxiliary tanks found approximately half-full with normal fuel.

1.6.7 Aircraft weight and balance

N/AP

1.6.8 Aircraft Maintenance

The only maintenance record found on board indicated that 200,600&1200 Hrs periodic inspections were performed on 30/05/2013.Other aircraft documents like line maintenance logs, journey logbook, and e.t.c are not carried on board. There is no information regarding maintenance done on the aircraft after as well as before 30/05/2013.

1.7 Meteorological information

N/AP

1.8 Aids to Navigation

N/AP

1.9 Communication

All communications between Flight EWZ-1149 and the ATC were normal and all facilities were in working order.

1.10 Aerodrome information

N/AP

1.11 Flight data recorder

The flight data-recording unit (BUR-1-2A) not found onboard. The location where the BUR-1-2A was supposed to be is empty. The aircraft is not equipped with cockpit voice recorder.

1.12 Wreckage and Impact Information

The aircraft touched the ground normally with all landing gears. After running for about 200 meters, the nose gear hit a high ground and collapsed back in to the cockpit piercing the floor between the captain and the co-pilot. The aircraft continued moving forward with its nose and front fuselage belly for another 150 meters during which it killed two cows and one ox. The nose fuselage belly and wing tip parts found scattered on the ground along the crash landing run.



Fig-2. The bottom part of the nose fuselage scratched the ground until it comes to rest.

1.13 Medical and Pathological Information

The captain, first officer and ground technician had undergone medical treatment in Hospital. No abnormalities found and discharged in satisfactory condition.

1.14 Fire

No fire broke out.

1.15 Survival Aspect

All crews survived with minor injuries.

1.16 Test and Research

The fuel appearance of the right wing out board tank found dark and impure. The fuel sample test result performed by the Ethiopian Petroleum Enterprise´s laboratory is shown in the following table.

No	Property	Test method	Limits	Test result
1	**Appearance ,visual**	Visual	Clear & bright	Not clear & bright
2	**Existent gum mg/100ml**	D 381	Max. 7	28.2
3	**Particulate matter**	D 5452	Max. 1	18.5

High existent gum is an indicative of contamination of fuel by higher boiling oils or particulate matter and

generally reflects poor handling practice during downstream distribution. Particulate matters due to poor handling practice causes filter plugging and other operational problems.

1.17 Organizational and Management Information

N/AV

1.18 Additional Information

After it was confirmed from the ATC that the aircraft had crash-landed, the SAR department of ECAA together with AIB launched search and rescue operation involving concerned partners like Red Cross, Federal Police & Ethiopian Air Force. All crews evacuated alive but with minor injuries from the aircraft and admitted to hospital for further treatment. All were discharged from the hospital in satisfactory conditions.

2 Analysis

2.1 Operational

The flight crews were licensed, qualified and medically fit for the flight in accordance with existing regulations.

Flight EWZ-1149 has been in contact consecutively with the ACC and the ATC. All communications between Flight EWZ-1149 and the ACC and Tower were recorded by the ATC facilities. There was no navigational & communication problem that contributed to this accident. Due to lack of flight data recordings, the investigation was unable to establish whether the pilot in command or the copilot reacted in accordance with emergency procedures.

2.2 Technical

The aircraft is registered and had a valid Certificate of Airworthiness for special flights (ferry flight). Maintenance record found on board indicated that 200,600 &1200 Hrs periodic inspections were performed on 30/05/2013.Other aircraft documents like line maintenance logs & journey logbook are not carried on board. Therefore, the maintenance history of the aircraft from 30/05/2013 until the accident is not known.

The flight data-recording unit (BUR-1-2A), which could have recorded important flight parameters, removed from the aircraft. No information is available regarding the operation of the engines and the aircraft fuel system during the flight.

No document is available for the modification and installation of auxiliary fuel tanks in the passenger compartment, which are not part of the standard configuration.

The aircraft was re-fuelled in Entebbe airport one day before the flight on 18/01/2014 with 3756 liters. The aircraft departed on 20/01/2014.

The right wing in board fuel cell found empty while the out board (feeder tank) was with some amount.

The fuel that remained in the aircraft (right wing out board tank) was contaminated while that in the auxiliary tanks was relatively pure and normal. Therefore, there were two types of fuel at the same time in the aircraft (normal & contaminated)

The test result of the fuel sample shows that there was a high concentration of existent gum and particulate matter beyond limits, which could lead to the clogging of filters and other operational problems. This is evidenced by the illumination of the caution light of the fuel filter of the right engine. The right engine might have flamed out due to this contaminated fuel.

The left wing fuel cells (inboard & outboard) found empty. The filling cup cover of the left out board tank found missing. The left engine might have flamed out due to lack of fuel.

The fact that the filling cup cover of the left out board tank found missing and there were two types of fuel at the same time in the aircraft (normal & contaminated) indicates that the fuel might have been looted and or changed after refueling.

The aircraft was damaged after landing by impact forces with ground obstacles

2.3 Survivability

Immediately after the notification of the accident by ATC, the SAR department of ECAA together with AIB launched search and rescue operation involving concerned partners like Red Cross, Federal Police & Ethiopian Air Force. All crews evacuated from the aircraft alive but with minor injuries and admitted to hospital for further treatment. The accident was survivable due to relatively flat landing surface and absence of fire following the accident. All crews discharged from the hospital in satisfactory conditions.

3. Conclusions

3.1 Findings

- The flight crews were licensed, qualified, medically fit for the flight.
- The aircraft is registered and had a valid Certificate of Airworthiness.
- Periodic inspections performed on 30/05/2013. Documents like line maintenance logs, journey

logbook not found on board and the maintenance history of the aircraft from 30/05/2013 until the accident is not known.

- The flight data-recording unit (BUR-1-2A) is removed from the aircraft and flight data are not recorded.
- No document is available for the modification and installation of auxiliary fuel tanks in the passenger compartment.
- There were two types of fuel that remained in the aircraft (contaminated and normal)
- The test result of the fuel sample shows that there was a high concentration of existent gum and particulate matter beyond limits, which could lead to filter clogging, and other operational problems.
- There was fuel in the right wing out board tank but contaminated and It is estimated that the right engine flamed out due to contaminated fuel and/or clogging of fuel filter.
- The left wing fuel cells found empty. The filling cup cover of the left out board tank found missing and it is estimated that the left engine flamed out due to lack of fuel.
- The aircraft was damaged after landing by impact forces with ground obstacles.
- The accident was survivable due to relatively flat landing surface and absence of fire following the accident

3.2 Probable Cause of the Accident

The investigation committee analyzed and revealed that the most probable cause of the accident (flameout of both engines) was:

- The use of contaminated fuel, which gradually clogged fuel filters and affected the normal operation of the engines.
- Engine starvation due to lack of fuel

3.3 Contributing factor

- Improper checking of the quality of fuel during refueling
- Not checking the closure of filling caps after refueling & during pre-flight inspection
- Modification of Auxiliary fuel tanks not properly checked and approved by the concerned body, in the passenger compartment.

4. Safety Recommendation

- Properly check the quality and sediment of fuel during refueling as well as the closure of filling caps after refueling and during pre-flight inspection.
- Any modification and/or upgrade work performed on the aircraft shall be approved by the regulatory body of the state of registry of the aircraft.
- Standard line items like BUR-1-2A, if have been removed for any reason, shall be reinstalled before further flight.

- Aircraft documents like journey logbook, flight log, shall be available onboard.

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Appendix H: Crash *site*

СПЕЦИАЛЬНЫЙ СЕРТИФИКАТ ЛЕТНОЙ ГОДНОСТИ
AIRWORTHINES CERTIFICATE FOR SPECIAL FLIGHTS

БЕЗ ПРАВА ВЫПОЛНЕНИЯ КОММЕРЧЕСКИХ ПЕРЕВОЗОК

РЕСПУБЛИКА КАЗАХСТАН
МИНИСТЕРСТВО ТРАНСПОРТА И КОММУНИКАЦИЙ

КОМИТЕТ ГРАЖДАНСКОЙ АВИАЦИИ

REPUBLIC OF KAZAKHSTAN
MINISTRY OF TRANSPORT AND COMMUNICATION

CIVIL AVIATION COMMITTEE

WITH NO COMMERCIAL AIR OPERATIONS RIGHTS

№ 233

1. Тип и назначение воздушного судна Aircraft type and category	2. Национальный и регистрационный знаки Aircraft's national & registration marks	3. Серийный (заводской) номер Serial (manufacture) number
Ан-28 (пассажирское) **An-28 (passenger)**	**UP-A2805**	**1AJ008-22**

4. Цель и маршрут полетов: **перелет по маршруту: Энтеббе (Уганда) – Шымкент (Республика Казахстан) – для перелета до места постоянного базирования.**
Purpose and route of flights **flight on route: Entebbe (Uganda) - Shymkent (Republic of Kazakhstan) - for flight to place of the constant basing.**

5. Воздушное судно внесено в Государственный реестр гражданских воздушных судов Республики Казахстан за **№ 494 от 27 мая 2008 г.**
The aircraft is included into State Register of Civil Aircrafts of the Republic of Kazakhstan under **№ 494 dated May 27, 2008**

6. Настоящее разрешение выдано на указанное выше воздушное судно в соответствии с «Законом об использовании воздушного пространства и деятельности авиации Республики Казахстан» и Конвенции о Международной гражданской авиации от 07.12.1944.
This certificate has been issued for the abovementioned aircraft in accordance with the Law «About the use of airspace and aviation activity of the Republic of Kazakhstan» and Convention about International Civil Aviation from 07.12.1944

7. Эксплуатация радиостанции разрешается позывными сигналами:
Approved radio call signs:
телеграфом (telegraph) _____ телефоном (telephone) **UP-A2805**

8. Эксплуатационные ограничения: на борту воздушного судна перевозка пассажиров **запрещена**
The operation limitations: transportation of passengers onboard the aircraft is **forbidden**

9. Разрешение на специальный полет недействителен для использования в иностранном воздушном пространстве без соответствующего разрешения авиационных властей этих государств.
The permission for special flights is invalid for use in foreign air space without conforming permission by aviation authorities of these states.

10. Срок действия разрешения до: **23 января 2014г.**
The permission is valid till: **January 23, 2014**

Заместитель Председателя Комитета гражданской авиации
Deputy Chairman of the Civil Aviation Committee

(Подпись, ФИО / Signature, name)

С. Мухтыбаев М.П.
S. Mukhtybayev stamp

Дата выдачи: **09 января 2014г.**
Date of issue: **January 09, 2014**

Appendix-A

REPUBLIC OF KAZAKHSTAN
TRANSPORTATION AND COMMUNICATION MINISTRY
COMMITTEE OF CIVIL AVIATION

CERTIFICATE
OF THE STATE REGISTRATION OF CIVIL AIRCRAFT
 # 494

1. State identification and registration number	2. Type and designation of an aircraft	3. Manufacturer's serial number of the aircraft
UP-A2805	**An-28 passenger**	**1АЙ008-22**

4. Owner: **"East Wing." Joint-Stock Company**

5. Operator: **"East Wing." Joint-Stock Company**

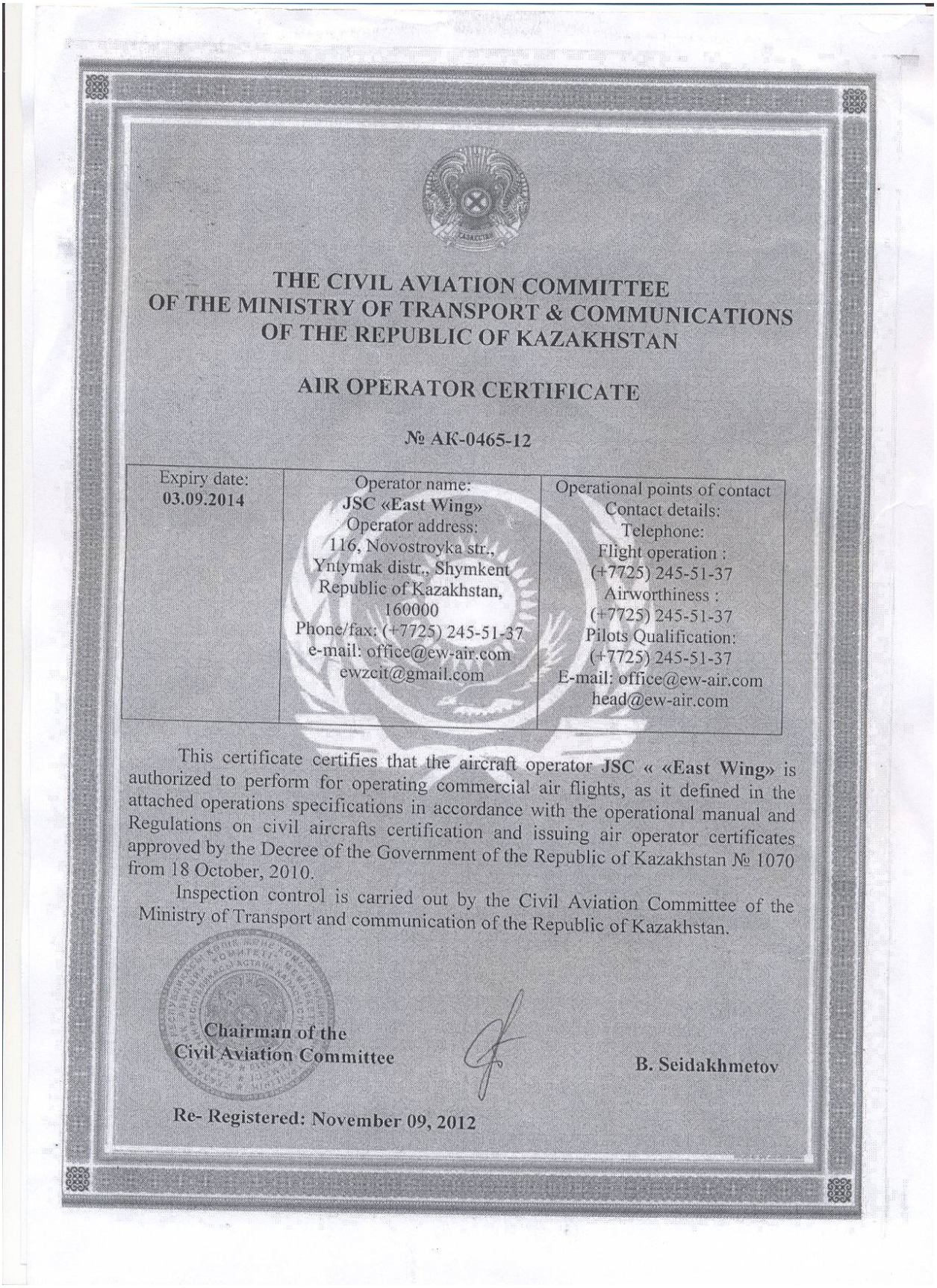
6. This is to certify that the aforementioned aircraft is duly registered with me State Civil Aircraft Registry of the Republic of Kazakhstan pursuant to Legislation of Republic of Kazakhstan and the International Civil Aviation Convention (Chicago, 1944).

7. This Certificate is issued for the purpose of registration and is intended to certify ownership of the civil aircraft.

Acting chairman of the Civil Aviation Committee (Signature) **R.Adimolda**

Date of issue: August 08, 2008

Appendix-B



THE CIVIL AVIATION COMMITTEE
OF THE MINISTRY OF TRANSPORT & COMMUNICATIONS
OF THE REPUBLIC OF KAZAKHSTAN

AIR OPERATOR CERTIFICATE

№ AK-0465-12

Expiry date:	Operator name:	Operational points of contact
03.09.2014	**JSC «East Wing»** Operator address: 116, Novostroyka str., Yntymak distr., Shymkent Republic of Kazakhstan, 160000 Phone/fax: (+7725) 245-51-37 e-mail: office@ew-air.com ewzcit@gmail.com	Contact details: Telephone: Flight operation : (+7725) 245-51-37 Airworthiness : (+7725) 245-51-37 Pilots Qualification: (+7725) 245-51-37 E-mail: office@ew-air.com head@ew-air.com

This certificate certifies that the aircraft operator **JSC « «East Wing»** is authorized to perform for operating commercial air flights, as it defined in the attached operations specifications in accordance with the operational manual and Regulations on civil aircrafts certification and issuing air operator certificates approved by the Decree of the Government of the Republic of Kazakhstan № 1070 from 18 October, 2010.

Inspection control is carried out by the Civil Aviation Committee of the Ministry of Transport and communication of the Republic of Kazakhstan.

Chairman of the
Civil Aviation Committee **B. Seidakhmetov**

Re- Registered: November 09, 2012

Appendix-C

ETHIOPIAN CIVIL AVIATION AUTHORITY
AIRCRAFT ACCIDENT / INCIDENT REPORT

For use by Pilot-in-Command submitting report on aircraft accident

Date and time Occurrence (UTC):			**Date of Report**
21/01/14 , 07.00 UTC			**21/01/2014:**
Aircraft type:	**Category:**	**Nationality:**	**Registration Mark:**
AN-28	Passenger	Kazakhstan	UP-A2805
Operator:	**Owner:**	**Location of accident:** Near Bole Airport	**Pilot in command:**
East Wing	East Wing	N0900.00, E038056	CTPL
Type of operation:		**Phase of operation:**	
Ferry flight		Approach for landing	
Last point of departure:		**Point of intended landing:**	
Entebbe (Uganda)		Hodeida (Yemen)	

Brief descriptions of Incident,
On 20.01.14, after performing the standard procedures and formalities, An-28 aircraft reg. mark Up-A2805 flight no EWZ 1149 took off from Uganda Entebbe (HUEN) to Hodeida /OYHD/ Yemen with flight level FL 150.The flight was normal. After 4:30 of flight, I heard a surge sound and the engine flamed out. I reported the case to the ATC of Addis Ababa airport and diverted to the airport. After 15 minutes of flight and at 15 about km from the airport, I heard the surge and flame out of the left engine. I make force landing on a flat surface that I selected from the air.

Name Stejar Vladimir, Pilot in command **Signature**

Appendix-D

Telefax 251 - (0)11 - 551 29 38
251 - (0)11 - 551 79 56
251 - (0)11 - 554 19 05
Email - eth-petroleum@ethionet.et

Telephones:
P.B.X. (251) - 011 - 551 32 88,
Direct: (251) - 011 - 551 00 45,
(251) - 011 - 552 60 30,
(251) - 011 - 554 19 04,
P.O.Box 3375
Addis Ababa - Ethiopia

የኢትዮጵያ ነዳጅ አቅራቢ ድርጅት
ETHIOPIAN PETROLEUM SUPPLY ENTERPRISE

Ethiopian Civil Aviation Authority
Tel. 011 665 02 00
Fax 011 665 02 81
Addis Ababa

Ref. No 3079/6.1.3.44/2014
04 FEB 2014

Subject- Test Result

With reference to your letter Ref. CO-5/8/06 dated January 29, 2014(21/05/06 E.C.), please find the test results for the Jet A-1 sample taken From Ethiopian Civil Aviation Authority Accident Prevention And Investigation Office as follows.

TEST REPORT

SN.	Property	Test Method ASTM	Limits	Test result
1.	Density@15 °C, g/ml	D 1298	0.775 - 0.840	0.8022
2.	Distillation	D 86		
	IBP, °C		-	134.5
	10% volume, recovered, °C		Max. 205	167.5
	20% volume, recovered, °C		-	174.5
	50% volume, recovered, °C		-	190.0
	90% volume, recovered, °C		-	221.5
	FBP, °C		Max. 300	249.0
	Distillation residue, %volume		Max. 1.5	0.8
	Distillation loss, %volume		Max. 1.5	0.4
3.	Flash point, Abel, °C	IP 170	Min. 38	43.5
4.	Copper strip corrosion, 2hrs@100 °C	D 130	Max. No. 1	1a
5.	Freezing point, °C	D 2386	Max. -47	-57
6.	Appearance, visual	Visual	Clear & bright	Not Clear & bright
7.	Existent gum, mg/100ml	D 381	Max. 7	28.2
8.	JFTOT	D 3241		
	JFTOT control temp. 260			260
	Filter pressure drop, mm Hg		Max. 25	1
	Tube deposit		< 3	1
	Heater tube color, visual		no peacock	No peacock
	Test volume, ml		-	450
9.	MSEP, with antistatic dissipater	D 3948	Min.70	Undefined and not valid
10.	Electrical Conductivity, pS/m	D2624	50 to 600	102
11.	Particulate matter,	D5452	Max. 1	18.5

* The results in this report relate only to the sample tested.

Remarks:-The sample meets AFQRJOS checklist issue 27 dated February, 2013 with respect to the above tests except Particulate matter, Existent gum, and Appearance tests.

Liability

Ethiopian Petroleum Supply Enterprise, its Laboratory, its Servants or agents Shall not be held liable for any damages, loss, claims or expenses direct or indirect howsoever caused, arising in connection with the laboratory test carried out on Jet A-1 Sample submitted to it for analysis whether in tort or in contract, due to any act, omission or error of whatever nature, whether or not negligence and howsoever caused. Furthermore all expenses and implied warranties are specifically disclaimed.

Regards,

Manaye Bulcha
Haad, Petroleum Quality Control Service

This test report shall not be reproduced or given to a third party without written approval of the **Petroleum Quality Control Service Head.**

ጥራቱን የጠበቀ የነዳጅ ምርት በማቅረብ ያለብራችንን ሌማት ለማሩጠን በሚደረገው ርብርብ ውስጥ የድርሻችንን እንወጣለን!

Appendix-E

የሩሲያ ቀይ መስቀል ማኅበር
RUSSIAN RED CROSS
ደጃዝማች ባልቻ ሆስፒታል
Dejazmach Balcha Hospital

MEDICAL REPORT

№ 0007576

February3, 2014

Name: StefarVladimir **Case history No.**166/91105**Sex:** male **Age:**55

Admission date: 20.01.14

Symptoms on admission: Complaints on pain in a lower jaw.

History: Trauma during a rough descend of a plane. The patient is conscious, adequate and orientated.

Preliminary diagnosis: Contusion of the lower jaw. Contusion of the left shin.Abrasion of the left shin.

Treatment given: Analgesics, anti-inflammatory therapy.

Discharged on 03.02.14. The patient is discharged in satisfactory condition.

Final diagnosis: Contusion of the lower jaw. Contusion of the left shin.Abrasion of the left shin.

Director General
Medical Director
Treating Doctor

Alexander Bruev
Natalia Shevyakova
Olga Grobova

The RRC Dej. Balcha Memorial Hospital
Lideta Kifle Ketema, Kebele 07, H.707
Tel. office : 011- 551 32 05, reception 011- 551 40 72
Fax 011- 551 62 63

Tin No 0001505844
P. O. Box 94
Addis Ababa
Ethiopia

Appendix-F

የሩሲያ ቀይ መስቀል ማኅበር
RUSSIAN RED CROSS
ደጃዝማች ባልቻ ሆስፒታል
Dejazmach Balcha Hospital

MEDICAL REPORT

№ 0000578

February3, 2014

Name: Yuri Gulin**Case history No.**164/91106 **Sex:** male **Age:**40

Admission date: 20.01.14

Symptoms on admission: Complaints on pains in projection ofthe right ankle joint in the zone of the left medial malleolus. There is a small edema.

Preliminary diagnosis: Contusion of the right ankle joint.

Results of examinations:

Blood test of 23.01.14: Hb- 155; RBC-4,42*10^{12}/l ; WBC- 7,2*10^{9}/l; EOS- 1; Staff cells-4; Segm- 73; Lymph- 20; Mon - 2; ESR – 3;
Malaria test – positive.
Stool test of23.01.14: Acute clinical amebiasis. Malaria falciparum.

X-ray of20.01.14: normal.

Consultation of infectionist: Diabetes mellitus, type II, decompensating stage.

Treatment given: anti-inflammatory therapy, Metronidazole, Quinine.

Discharged on 03.02.14. The patient is discharged in satisfactory condition.

Final diagnosis: Contusion of the right ankle joint.

Director General — Alexander Bruev
Medical Director — Natalia Shevyakova
Treating Doctor — Olga Grobova

The RRC Dej. Balcha Memorial Hospital
Lideta Kifle Ketema, Kebele 07, H.707
Tel. office : 011- 551 32 05, reception 011- 551 40 72
Fax 011- 551 62 63

Tin No 0001505844
P. O. Box 94
Addis Ababa
Ethiopia

Appendix-F

የሩሲያ ቀይ መስቀል ማኅበር
RUSSIAN RED CROSS
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Dejazmach Balcha Hospital

MEDICAL REPORT

№ 0000577

February3, 2014

Name: EsenamanMukashevich**Case history No.**168/91107 **Sex:** male **Age:**56

Admission date: 20.01.14

Symptoms on admission: Complaints on pain in a lowerankle joint.

History: Traumaof 20.01.14duringrough descend of a plane. The patient is conscious, adequate and orientated.Pulse 80 bpm.Blood pressure 120/70. Small edema of the left ankle joint. Palpation of thorax is painful. Crepitation if ribs is absent.

Preliminary diagnosis: Closed trauma of thorax. Contusion of the left part of thorax.

X-ray of20.01.14: normal.

Consultation of neurologist: Diabetes mellitus, type II, decompensating stage.

Treatment given: Analgesics, anti-inflammatory therapy.

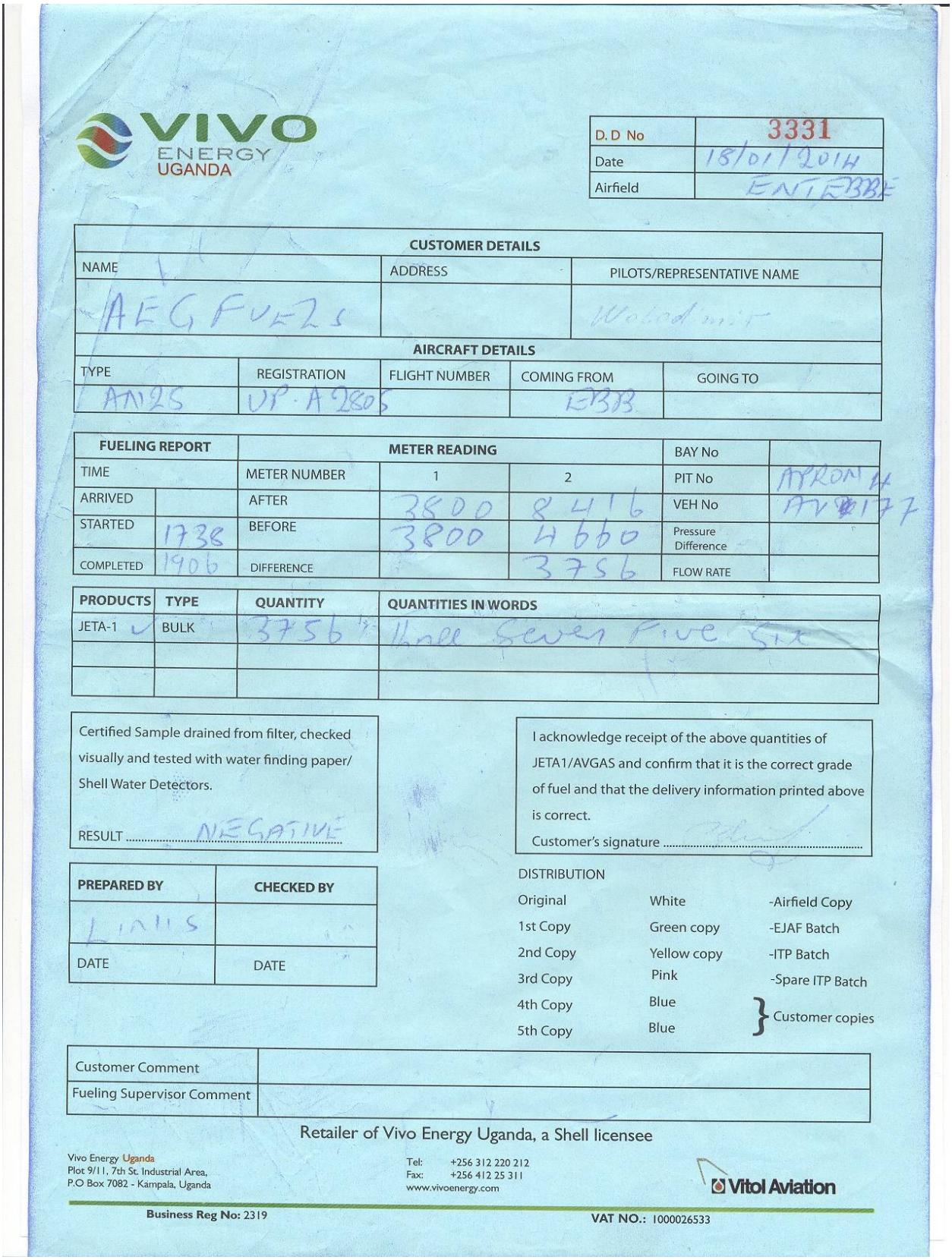
Discharged on 03.02.14. The patient is discharged in satisfactory condition.

Final diagnosis: Closed trauma of thorax. Contusion of the left part of thorax.. Contusion of the left ankle.

Director General — Alexander Bruev
Medical Director — Natalia Shevyakova
Treating Doctor — Olga Grobova

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Fax 011- 551 62 63

Tin No 0001505844
P. O. Box 94
Addis Ababa
Ethiopia



VIVO ENERGY UGANDA

D. D No	3331
Date	18/01/2014
Airfield	ENTEBBE

CUSTOMER DETAILS		
NAME	ADDRESS	PILOTS/REPRESENTATIVE NAME
AEG FUELS		Wolodimir

AIRCRAFT DETAILS				
TYPE	REGISTRATION	FLIGHT NUMBER	COMING FROM	GOING TO
AN25	UP-A2805		EBBB	

FUELING REPORT		METER READING			BAY No	
TIME		METER NUMBER	1	2	PIT No	AYRON 4
ARRIVED		AFTER	3800	8416	VEH No	AV0177
STARTED	1736	BEFORE	3800	4660	Pressure Difference	
COMPLETED	1906	DIFFERENCE		3756	FLOW RATE	

PRODUCTS	TYPE	QUANTITY	QUANTITIES IN WORDS
JETA-1	BULK	3756	three Seven Five Six

Certified Sample drained from filter, checked visually and tested with water finding paper/ Shell Water Detectors.

RESULT ..... NEGATIVE

I acknowledge receipt of the above quantities of JETA1/AVGAS and confirm that it is the correct grade of fuel and that the delivery information printed above is correct.

Customer's signature .....

PREPARED BY	CHECKED BY
LINUS	
DATE	DATE

DISTRIBUTION

Original	White	-Airfield Copy
1st Copy	Green copy	-EJAF Batch
2nd Copy	Yellow copy	-ITP Batch
3rd Copy	Pink	-Spare ITP Batch
4th Copy	Blue	} Customer copies
5th Copy	Blue	

Customer Comment	
Fueling Supervisor Comment	

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Vivo Energy Uganda
Plot 9/11, 7th St. Industrial Area,
P.O Box 7082 - Kampala, Uganda

Tel: +256 312 220 212
Fax: +256 412 25 311
www.vivoenergy.com

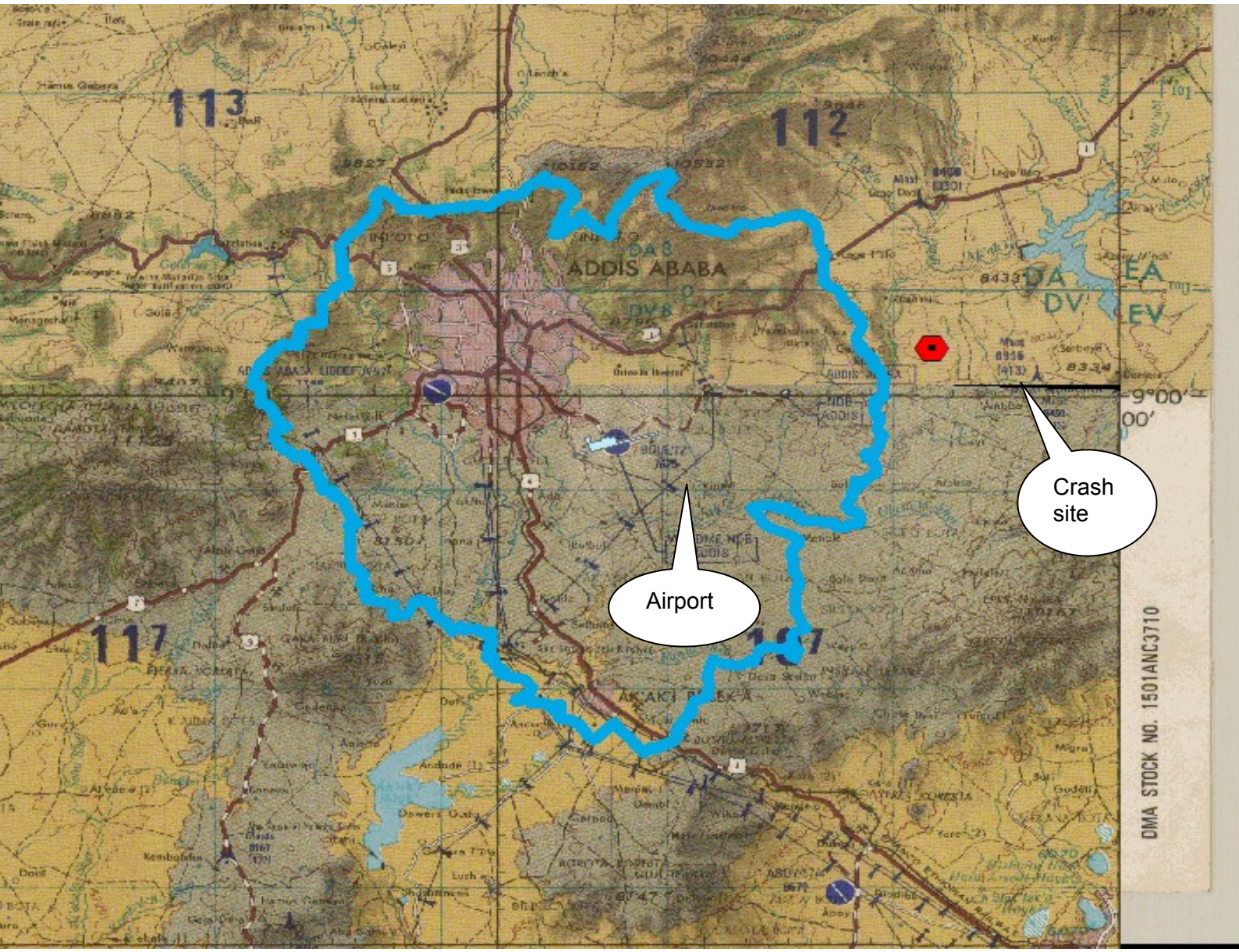
Vitol Aviation

Business Reg No: 2319

VAT NO.: 1000026533

Appendix-G

Appendix-H


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ADDIS ABABA
Crash site
Airport
DMA STOCK NO. 1501ANC3710