2017 ASPECT Preliminary Report
Arkema Plant Response
Crosby, TX

September 1, 2017
0500 hrs to ???? hrs

Figure 1: Infrared Image of two refrigerated containers at the Arkmen Facility on 31 August 2017

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1 Background

On 30 August 2017 at 0445 hrs the US EPA Region 6 On-Scene Coordinator Byrant Smalley contacted ASPECT Program Manager, Dr. Mark Thomas, to activate the ASPECT aircraft and respond to the Arkema Facility explosion located in Crosby, Texas. The facility produces liquid organic peroxides that are used mainly in the production of plastic resins. The explosion was a result of a loss of refrigeration in temporary storage trailers.

After conducting three flights on 31 August 2017, the ASPECT aircrew will move their base of operations from Addison Airfield to Hobby Airfield. Pending any maintenance issues, this will position the aircraft closer to the target areas and reduce the transit time by more than one hour. The ASPECT technical reach-back team will remain in Addison, TX.

A detailed summary of the ASPECT operations on 31 August 2017 is available in a different report. This report will begin with a detailed summary of the ASPECT operations scheduled for 1 September 2017. Table 1 provides a brief summary of the ASPECT products to date.

Date	*# Flights*	*Aerial Photos*	*Oblique Photos#*	*FTIR spectra**
31 August 2017	3	124	184	88,500

Some photos were not be viewable/usable due to poor lighting or weather conditions at the time they were taken.
* The collection frequency of FTIR spectra is 70 spectra per second.

ASPECT continues to fly in the TFR area (Temporary Flight Restriction) under an assigned squawk code in close coordination with the U.S. Coast Guard. The aircraft does not fly through known chemical plumes or take air samples. It uses a passive remote sensing technology that can detection vapors at its routine survey altitude of about 3,000 ft above the hazard.

ASPECT products are viewable using Google Earth by using the Google Earth "n-link" file which can be made available by contacting EPA R6 officials.

2 Aircraft Capabilities used on this survey

Chemical Detection:
The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 2,800 AGL). The ASPECT System is an emergency response aircraft permitting remote chemical detection in support of the first responder. The system consists of an airborne high speed Fourier transform infrared spectrometer (FTIR) coupled with a wide-area IR line scanner. The ASPECT IR systems have the ability to detect compounds in both the 8 to 12 micron (800 to 1200 cm-1) and 3 to 5 micron (2000 to 3200 cm-1) regions. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon—non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The Carbon – Hydrogen stretch is very common in this region.

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Photo Capabilities:
A still digital Nikon DX2 camera collects visible aerial imagery as part of the core data product package. It consists of a 12.4 mega pixel CMOS camera supporting a 3:5 aspect ratio frame. The system uses a 28 mm wide-angle lens and is slaved to the primary IR sensors and provides concurrent image collection when other sensors are triggered. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while the aircraft is in flight status or approximately 600 frames per hour can be automatically batch processed once the data is downloaded from the aircraft.

An Imperx mapping camera provides a similar aspect ratio and aerial coverage at a much higher resolution (29 mega pixels). Like the Nikon DX2, it is slaved to the primary IR sensors and provided concurrent image collection when other sensors are triggered. These images are often digitally processed in lower resolution so they can be transmitted via satellite communication. The high resolution images are pulled from the ASPECT after the sortie and often made available at a later time.

Data are processed using onboard algorithms while the aircraft is in flight and preliminary results are sent using a satellite system to the ASPECT reach back team for QA/QC analysis. The reach back team is operating from small hanger offices located at Million Air, Addison, TX.

3 Results

Flight #6

0530 hrs: ASPECT was airborne by 0530 hrs CST to monitor the Arkema facility. They expect to be over the facility about 0650 hrs. The aircraft with loiter near the facility and make periodic (every 30 minutes) chemical screening measurements over the facility.

A second mission will be begin later today to provide rapid needs assessment of selected targets east and northeast of the Houston area. The targets were provided by Region 6 and include Remedial Management Plan (RMP) locations, wastewater and water treatment facilities and National Priority List (NPL) sites. Flight paths are being developed to collect aerial images over about 1,000 sites.

Weather conditions over Crosby, TX are expected to partly cloudy skies with about 10 miles of visibility. Light winds from the north at ground level (pressure 1015 mbar). The surface temperature is 21°C with a humidity of 93%. Flight conditions at altitude were reported to be turbulent. The crew reported that they can see the fire but there was no visible plume over the facility.

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0720 hrs: ASPECT made numerous passes over the facility and there were no significant chemical detections. The crew reported that the IR video showed that the trailers are cool. See Figure 2.

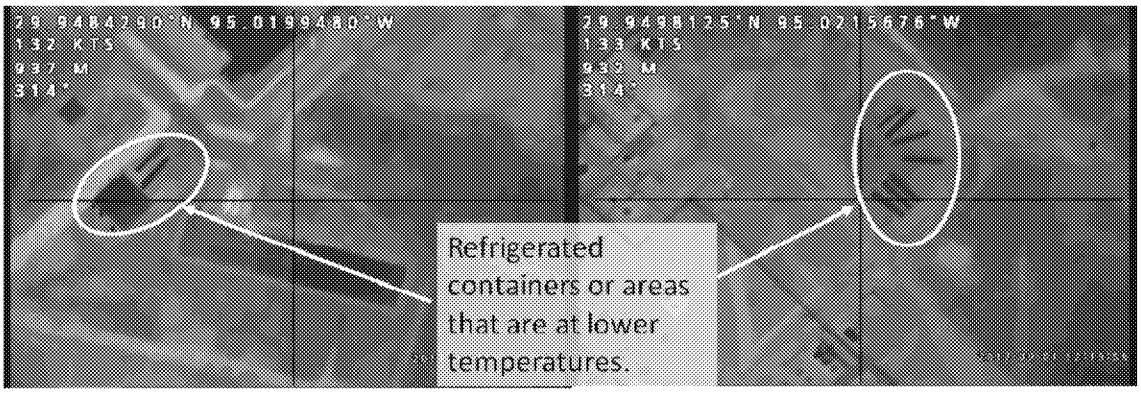

Figure 2: Infrared images obtained from an infrared video (0750 hrs CST) clearly show that the containers are being cooled (black colors) at the Arkema facility.

0750 hrs: ASPECT made numerous passes over the facility and there were no significant chemical detections. IR video continues to show similar images as shown in Figure 2.

0830 hrs: ASPECT made numerous passes over the facility and there were no significant chemical detections. IR video continues to show similar images as shown in Figure 2.

0900 hrs: ASPECT is heading to Hobby Airfield to refuel and upload data.

4 Operational Challenges

1. Satellite communications appear to be back at normal speeds (about 20 kbs download). We continue to monitor this situation.

2. The technical reach-back team continues to actively address recording issues with the infrared line scanner (IRLS) system. It appears that the recording computer is failing in the aircraft. Overnight, the team replaced the IRLS motherboard and conducted a test flight. Results indicated that the issues had been resolved but during Flight 6 similar faults were observed, suggesting that the cause is more complex. Currently this capability is not available. The night vision camera has been reconfigured as a thermal imaging system as a backup. Efforts to fix the IRLS continue, however a fix cannot occur until the team completes a critical examination of the system. That work cannot occur while the aircraft is station at Hobby Airfield.

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5 ASPECT Team and Crew

Dr. Mark Thomas, ASPECT Program Manager
Dr. John Cardarelli II, ASPECT Radiological / Tech Lead
Mr. Timothy Curry, ASPECT Logistics/Finance Lead
Dr. Robert Kroutil, Kalman Co Inc.ASPECT Chemical / GIS Lead (contractor)
Dr. Brian Dess, Kalman Co Inc. ASPECT Chemical / IT support (contractor)

Sam Fritcher, Airborne ASPECT Inc., CEO
Beorn Leger, Airborne ASPECT Inc., Chief Pilot
Ned Conner, Airborne ASPECT Inc., Pilot
Tom Cruise, Airborne ASPECT Inc., ATP/Operator
Dallas Sley, Airborne ASPECT Inc., Equipment Operator
Robert Kirby, Airborne ASPECT Inc., Engineer
Bruce Dingman, Airborne ASPECT Engineering Tech.

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