

# **TCEQ Referenced and Responsive Documents**

**March 19, 2019**

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## **CITED MATERIAL**

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**From:** Lefer, Barry L. (HQ-DK000)  
**To:** [David Gray](#); [Michael Honeycutt](#)  
**Subject:** More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:49:43 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)

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David and Michael,

I wanted to reach out to you to provide you with as much information that you need regarding the proposed NASA DC-8 flight over southeastern Texas scheduled for Thursday, September 14<sup>th</sup>.

The NASA Atmospheric Tomography mission is preparing for a Pole-to-Pole sampling of background atmospheric composition, and the first test flight is scheduled for Thursday, September 14<sup>th</sup>. The science team thought that it could be interesting scientifically to sample the atmosphere of southeastern Texas as the region is recovering from Hurricane Harvey. The instrument payload (see <https://espo.nasa.gov/home/atom/instruments>) is not optimized for urban sampling, rather, for the opposite). Nevertheless, it could provide an interesting snapshot of the current conditions.

Attached is additional information, including our flight track and flight plans. We would like to work with EPA and TCEQ to provide both of you with the most useful data possible for your missions. From the NASA point of view, I want to stress two points regarding this effort:

- 1. The design of this flight is regional in scope.** The overall goal is to assess the photochemical reactivity of the atmosphere and compare to the many earlier flights/campaigns in this region. The payload has superb capabilities for looking at the second stage products of photochemical pollution - formaldehyde, peroxides, nitrates -- and the radical drivers (NO<sub>x</sub>, HO<sub>x</sub>). We can assess if large changes have followed the disaster. Small changes cannot be assessed this way.
- 2. The ATom DC-8 will not (firstly, because it is not able to) sample emissions from facilities in any effective way.** All our VOC observations are time averaged (flasks; on-board GCs). Facility emissions are not the focus of the flight that we have planned. We should not in any way duplicate or interfere with Texas data collection or dissemination of information, as far as I can tell.

I will be available Sunday night, all-day Monday and all-day Tuesday. Please contact me via email or phone and I would be happy to work with you to answer your questions and try to address any concerns.

Best regards. Sincerely, Barry

--

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**From:** [Michael Honeycutt](#)  
**To:** [David Brymer](#)  
**Subject:** FW: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Monday, September 11, 2017 8:33:00 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[image001.png](#)

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David,

I'm not sure how I got roped into this, but NASA is offering to do some flyovers. I'll follow up with some other emails. Haven't they done some work with you guys? Would this be useful? Right now, I think we're more interested in finding leaking sources than research.

Mike



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**From:** Lefer, Barry L. (HQ-DK000) [mailto:[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)]  
**Sent:** Sunday, September 10, 2017 10:50 AM  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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**TCEQ-0005**

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MUST READS CALIFORNIA LOCAL

# Post-Hurricane Harvey, NASA tried to fly a pollution-spotting plane over Houston. The EPA said no

By SUSANNE RUST and LOUIS SAHAGUN  
MAR 05, 2019 | 3:00 AM



A NASA-operated DC-8 stationed in Palmdale is used to collect and analyze atmospheric samples from around the world. The plane was not used to analyze pollution data in the aftermath of Hurricane Harvey. (Al Seib / Los Angeles Times)

In the weeks after Hurricane Harvey's catastrophic sweep through the Houston area — which resulted in chemical spills, fires, flooded storage tanks and damaged industrial plants — rescue crews and residents complained of burning throats, nausea and dizziness.

Fifteen hundred miles west in the high desert city of Palmdale, NASA scientists were preparing to fly a DC-8, equipped with the world's most sophisticated air samplers over the hurricane zone to monitor pollution levels.

The mission never got off the ground. Both the state of Texas and the EPA told the scientists to stay away.

According to emails obtained by The Times via a public records request and interviews with dozens of scientists and officials familiar with the situation, EPA and state officials argued that NASA's data would cause "confusion" and might "overlap" with their own analysis — which was showing only a few, isolated spots of concern.

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"At this time, we don't think your data would be useful," Michael Honeycutt, Texas' director of toxicology, wrote to NASA officials, adding that low-flying helicopters equipped with infra-red cameras, contracted by his agency, would be sufficient.

EPA deferred to Honeycutt, a controversial toxicologist who has suggested air pollution may be beneficial to human health.

The response stunned NASA scientists, many of whom had flown similar missions in the past, including over the 2010 Deepwater Horizon oil spill in the Gulf of Mexico.

An EPA spokesman said the decision to wave off the Hurricane Harvey mission was made by Texas state officials, whose own pollution monitoring efforts included mobile bus units and crews with hand-held devices on the ground.

But NASA scientists say that, had the DC-8 been deployed, it would have provided the most comprehensive and detailed analysis of air quality in the region, allowing for a more thorough understanding of the situation.

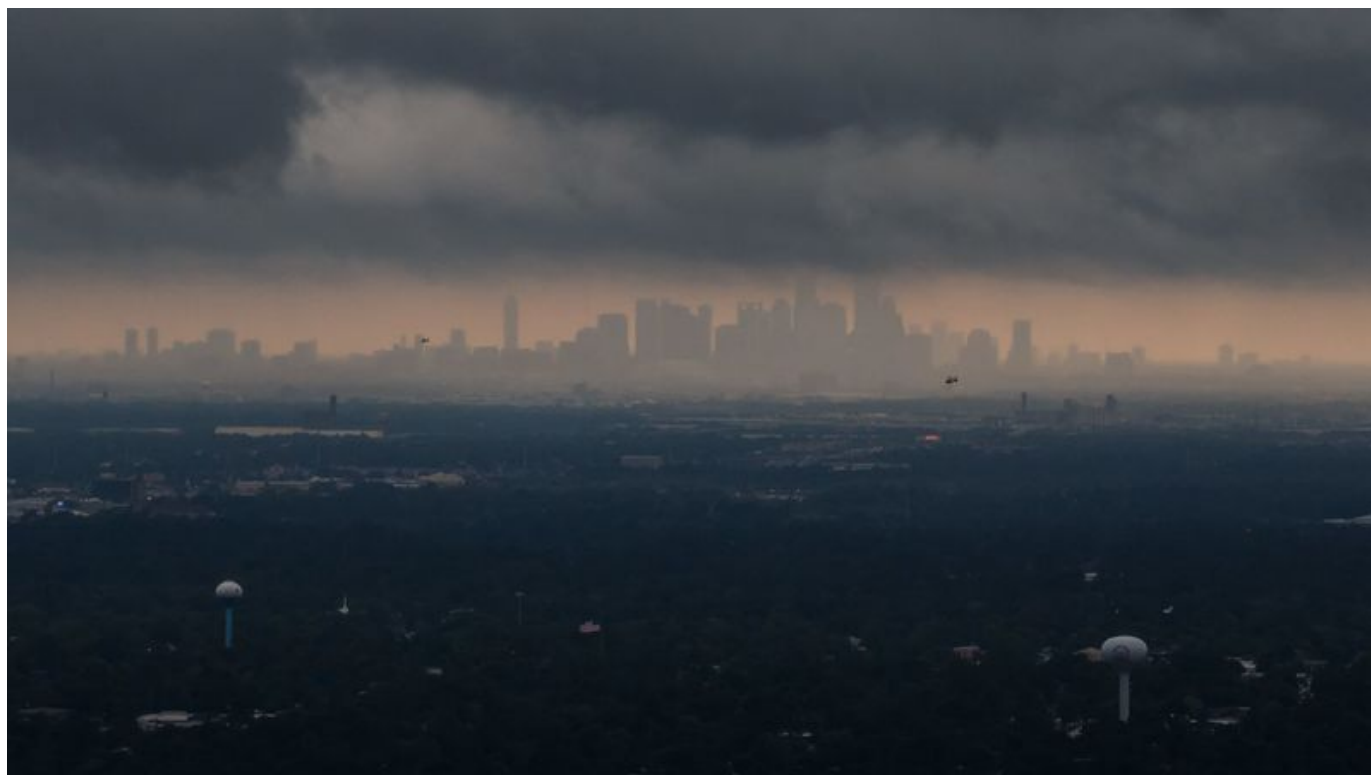
“It’s totally possible we’d have found nothing at all to be concerned about,” said Tom Ryerson, a National Oceanic and Atmospheric Administration researcher who had previously been part of the Deepwater Horizon mission. “But at least we’d have known that,” he said, “without a doubt.”

Some see the EPA decision as part of a pattern.

Since taking office, the Trump administration has rejected and suppressed established science, partnered with fringe researchers and embraced industry-backed views — including appointing a former coal lobbyist as its new EPA administrator.

At the time of the hurricane, the agency was run by Scott Pruitt, who during his tenure targeted dozens of environmental regulations for rollback, including several focused on air pollution.

“This is a very clear illustration of the politics of knowledge,” said Scott Frickel, an environmental sociologist at Brown University, referring to the rejection of the NASA jet. “The EPA Region 6 and Texas authorities don’t want to know, so they are passing on something really important about urban-scale disasters.”



Hurricane Harvey's storm clouds in Houston on Aug. 29, 2017 (Marcus Yam / Los Angeles Times)

## Clouds of benzene over Houston

On Aug. 25, 2017, Harvey stalled over the Texas coast, unleashing record rainfall on Houston and Galveston.

The area is one of the most heavily concentrated industrialized hubs in the nation, home to thousands of petroleum refineries and chemical manufacturing plants and more than a dozen Superfund sites. Over the next eight days, the storm dumped more than 60 inches of rain on some areas of the region, pummeling it with wind gusts in excess of 150 mph, according to the U.S. Geological Survey and EPA.

On Aug. 28, Gov. Greg Abbott suspended state emission rules, including those governing air pollution, after the Texas Commission on Environmental Quality argued they would impede disaster response. The rules remained suspended for the next seven months.

When the storm finally moved north and east on Sept. 4, the level of environmental destruction and confusion on the ground was unprecedented.

Smokestacks, pipelines and generators had been damaged or destroyed. Storage tanks filled with toxic chemicals were battered and leaking. Superfund sites were flooded, spilling hazardous waste into nearby rivers, streams and neighborhoods.

Officials from the EPA and the state environmental agency, which had shut down their stationary air monitors to avoid storm damage, maintained the air quality was fine. In addition to using ground technology, they flew in a single-engine prop plane that took photos and used infrared technology to detect chemical plumes in the area.

Despite EPA claims that pollutants were “well below levels of health concern,” residents and rescuers complained of the fumes. Clouds of benzene and other cancer-causing chemicals floated over the city, according to analyses by environmental groups and news reports.

As those reports spread, researchers with NASA’s Atmospheric Tomography Mission program thought they could help.

Since 2016, the chemistry laboratory has flown more than 197,000 miles around the globe, sampling hundreds of unique airborne gases or particles.

The team was about to embark on its fourth and final mission around the globe and had planned a six-hour test flight for Sept. 14 that would take them east to Lamont, Okla., where they’d carry out compass measurements, before heading back to Palmdale.





Chris Jennison, a DC-8 mission manager, aboard the NASA-operated plane in Palmdale (Al Seib / Los Angeles Times)

The laboratory inside the DC-8, when running at full capacity, hosts roughly three dozen scientists and engineers and a crew of eight. Tubes, spigots and flasks on the aircraft's exterior guzzle in air samples as the jet bobs up and down between its lowest altitude of 500 feet and its ceiling at 40,000 feet.

"When fully equipped ... it bristles like a porcupine with probes, tubes and laser equipment sticking out of the hull and windows and dangling off the wings — all of them plugged into instruments on board," said Chris Jennison, the DC-8 mission manager, during a recent tour of the plane.

It is the most precise and comprehensive airborne air quality lab on the planet, according to scientists familiar with the equipment. Where the EPA's air pollution single-prop plane can gather some basic chemistry of about two dozen species of air-pollutant compounds, the NASA jet can analyze more than 450.

As the team watched the disaster unfold, Paul Newman, chief scientist of NASA's Earth Science Division, suggested they divert their test run and fly over Houston. The timing was serendipitous. The DC-8 was fully equipped and ready to go.

"We agreed this would be a good opportunity to support the Hurricane Harvey recovery effort," Lawrence Friedl, NASA's director of Applied Sciences wrote in a Sept. 8, 2017 email to the agency's then-acting Administrator Robert Lightfoot and others. Indeed, NASA's press shop was touting its coordination with the hurricane emergency response.

But over the next few days, it became clear neither the EPA nor the state of Texas saw this particular offer in that same light.



The NASA-operated DC-8 in its Palmdale hangar between missions (Al Seib / Los Angeles Times)

### Emails detail how EPA officials fretted about ‘overlaps’

On Sept. 9, David Gray, the EPA's deputy regional administrator in Texas and leader of the agency's emergency response, wrote to NASA and Texas officials that he was "hesitant" to have the jet "collect additional information that overlaps our existing efforts" until he learned more about the mission. He noted that media and nongovernmental organizations were releasing data that was "conflicting" with the state and EPA's.

NASA scientists tried to reassure Gray and Honeycutt that they wouldn't do anything to hinder the data collection efforts. They said they wouldn't focus on particular facility emissions but instead assess whether large changes in air quality had occurred following the disaster. They also promised not to deliver their data to the media, although they underscored it would eventually be made public.

In addition, they noted, similar interagency missions had succeeded in the past. In 2010, a NOAA plane with a similar payload aided the EPA in assessing air quality over the Deepwater Horizon spill. The data showed Gulf air was OK to breathe, assuaging the concerns of rescue operators and emergency responders.



Jane Lubchenco, the former NOAA administrator who oversaw the Deepwater Horizon mission, said the cooperation and tone of discussion then “was set at the highest level: The president made it clear he wanted teamwork throughout.”

“There is no good reason why that cannot happen most of the time,” she said.

But the NASA scientists’ assurances didn’t work.

The key decision-maker was Honeycutt, known for his energy industry-friendly views on toxic chemicals and pollutants. Six weeks later, Trump’s EPA would appoint Honeycutt chairman of the agency’s Science Advisory Board, an independent panel of scientists charged with providing advice to the agency’s administrator.

On Sept. 11, Honeycutt wrote in an email to NASA and EPA officials that state data showed no sign for concern, and “we don’t think your data would be useful for source identification while industry continues to restart their operations.”

Gray agreed with Honeycutt: “EPA concurs with your assessment and we will not plan to ask NASA to conduct this mission.”

The NASA team was stupefied.

“NASA does NOT need EPA approval,” Newman wrote to the team’s project coordinator, Barry Lefer. “We certainly should notify and potentially coordinate, but we don’t need approval.”

His superiors disagreed, and that evening Michael Freilich, the director of NASA’s Earth Sciences division, called off the flight. Freilich retired on Feb. 28.

The agency had “received emails from both TCEQ and EPA stating unambiguously that they do not want NASA to use the DC-8 for any data acquisition,” he wrote. “I am personally sorry.”

In recent interviews, EPA and Texas officials maintained the NASA flight would not have provided useful information.

“NASA is equipped to gather atmospheric chemistry data, not ground-level data, which is why we declined their offer,” Honeycutt wrote in an email.

“I did not tell NASA they could not fly their DC-8,” he said. “I don’t have that kind of authority; I’m just a state employee.”

John Konkus, an EPA spokesman, said the EPA didn’t deny the offer, either.

“This is EPA facilitating the decision-maker, which in this case was the state,” he said. EPA, he said, was “satisfied with the air monitoring technology that EPA had and [that the state] requested we deploy.”

An investigation from the Associated Press and the Houston Chronicle showed there was widespread, unreported pollution and environmental damage in the region. The team identified more than 100 Harvey-related toxic releases, most of which were never publicized or vastly understated, including a cloud of hydrochloric acid that leaked from a damaged pipeline and a gasoline spill from an oil terminal that formed “a vapor cloud.”

Even if the DC-8 flight had not detected that pollution, it is unsettling that NASA was prevented from even looking, Newman said.

**TCEQ-0013**

“Science is about numbers,” he said. “And if you’re unwilling to look, you’re not doing science.”



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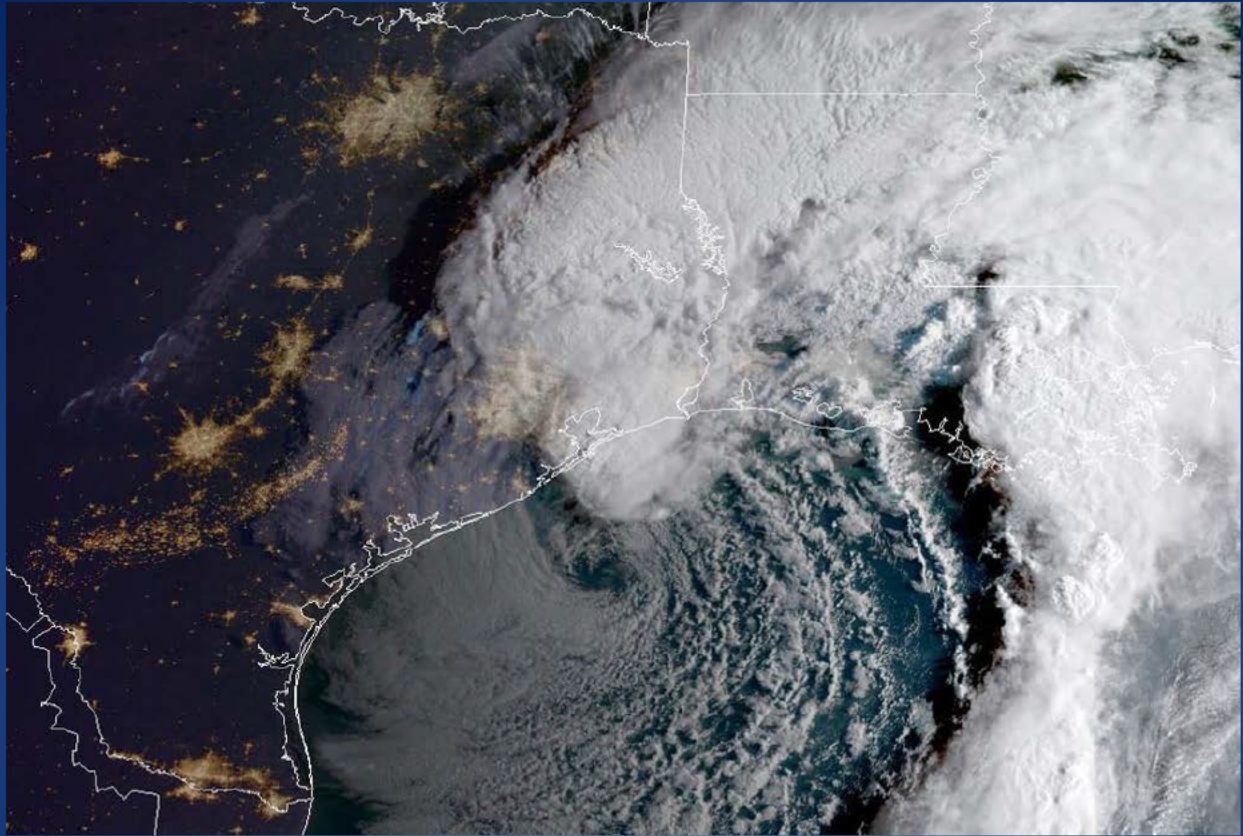
## Susanne Rust

Susanne Rust is an investigative reporter specializing in environmental issues. Before coming to the Los Angeles Times, she was the editor of Columbia University’s Energy & Environmental Reporting Project, where she oversaw several reporting projects, including a series that examined ExxonMobil’s understanding of climate science in the 1980s, 1990s and early 2000s. Rust started her career in 2003 as a science reporter at the Milwaukee Journal Sentinel. She is the recipient of numerous journalism awards, and was a John S. Knight fellow at Stanford University in 2009, and the Center for Investigative Reporting’s environment reporter between 2010 and 2014.



## Louis Sahagun

Louis Sahagun is a staff writer at the Los Angeles Times. He covers issues ranging from religion, culture and the environment to crime, politics and water. He was on the team of L.A. Times writers that earned the Pulitzer Prize in public service for a series on Latinos in Southern California and the team that was a finalist in 2015 for the Pulitzer Prize in breaking news. He is a CCNMA: Latino Journalists of California board member, and author of the book, “Master of the Mysteries: the Life of Manly Palmer Hall.”



# Hurricane Harvey Response 2017

## **AFTER ACTION REVIEW REPORT**

**April 3, 2018**

**Texas Commission on Environmental Quality**



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# After Action Review

## TCEQ Hurricane Harvey Response

### 1.0 Introduction

Organizational learning requires that agencies continuously assess their performance to identify and learn from successes and failures. The After Action Review (AAR) is an effective approach for capturing the knowledge gained from disaster response events. Conducting an AAR at the end of a large disaster response like Hurricane Harvey (Harvey) provides a valuable opportunity for capturing those lessons learned for what went well, so those actions can be applied forward. The AAR also allows us to identify those actions that did not go well, so they can be improved and not repeated in the future. Furthermore, sharing the results from an AAR can help staff responding to future disasters learn from our past successful strategies and avoid pitfalls we have already worked to overcome.

As improvement actions are identified and addressed, it is important that any relevant plans, policies and procedures are updated accordingly.

### 2.0 Hurricane Harvey Impact

Harvey made landfall on August 25, 2017 at 10:00 p.m. CT, as a Category 4 storm near Rockport, Texas and stalled over southeastern Texas. Due to its slow motion and a week-long period of onshore flow, more than 19 trillion gallons of rainwater fell on parts of Texas, causing catastrophic flooding. Some of the most devastating impacts from Harvey included:

- The highest storm surge was recorded at 12.5 feet located northeast of Corpus Christi, at the Aransas Wildlife Refuge;
- The highest total rainfall in U.S. history of 60.58 inches fell near Nederland, Texas due to Harvey in just a few days;
- Local, state and federal first responders rescued 122,331 people and 5,234 pets;
- Over 270,000 homes were impacted by Harvey with nearly 80,000 homes having at least 18 inches of floodwater, and 23,000 of those with more than 5 feet;
- 61 public-water systems and 40 wastewater-treatment facilities were rendered inoperable or even destroyed at the height of the storm. And more than 200 public-water systems had to issue boil-water notices because of problems caused by the storm; and,
- Large quantities of debris also accumulated due to the damage from extreme winds and widespread flooding that occurred during Harvey, which generated an estimated 15.9 million cubic yards of storm debris.



### **3.0 Hurricane Harvey Timeline**

- Aug 25 (Friday) – Harvey makes landfall in the Rockport/Port Aransas area near Corpus Christi with 130 mph winds. The Category 4 hurricane left 250,000 people without power.
- Aug 26 (Saturday) – Harvey moves slowly inland towards Houston where it remained for four days (Houston area begins to receive heavy rain).
- Aug 27 (Sunday) – Harvey continues to meander inland (Houston area continues to receive heavy rainfall).
- Aug 28 (Monday) – Harvey moves back over the Gulf coastline (Houston experiencing catastrophic flooding).
- Aug 29 (Tuesday) – Harvey moves east over the Gulf coastline (Houston continues experiencing catastrophic flooding) Beaumont/Port Arthur area receives heavy rainfall. Harvey drops 26 inches of rain in 24 hours in Port Arthur.
- Aug 30 (Wednesday) – Harvey makes second landfall at Cameron, Louisiana (Beaumont/Port Arthur experience heavy rain and catastrophic flooding).
- Aug 31 (Thursday) – The National Hurricane Center stops tracking Harvey.

### **4.0 TCEQ Responsibilities under Texas Emergency Management Plan (EMP)**

TCEQ is responsible not only for continuing its own business operations in emergency situations, but also providing strategic state assets to support state and local operations as well as assisting its regulated facilities in their efforts to continue to provide essential services to the public.

The State of Texas EMP lays out the responsibilities of TCEQ and each state agency in preparing for, responding to, and recovering from natural and/or manmade disasters and emergencies.

- Under the plan TCEQ is the primary agency responsible for Annex Q, Hazardous Materials and Oil Spill Response; and,
- Under the plan TCEQ is also a support agency for Annex K, Public Works and Engineering.

In the State Hurricane Annex, which is a supplement to the State EMP, the TCEQ is also assigned responsibilities that include:

- conducting rapid needs assessments in conjunction with Natural Disaster Operational Workgroup (NDOW) partners;
- coordinating and processing fuel waivers;
- assessing and providing technical infrastructure assistance to public water supply systems and wastewater systems;
- assessing dams;

- authorizing temporary debris management sites;
- supporting interoperable communications;
- providing a mobile command post to support Emergency Support Functions (ESF) #3 and #10 operations; and,
- coordinating hazmat and oil spill recovery operations.

## **5.0 TCEQ Hurricane Harvey Response Summary**

The TCEQ conducted response activities related to the devastating impacts from Harvey. The TCEQ participated in a Unified Command Structure with both state and federal response partners. Due to the large area impacted by Harvey, three operational branches were created. The Unified Command and the Alpha Branch were located in Corpus Christi, Bravo Branch was established in Houston, and Charlie Branch was setup in Beaumont. At the height of TCEQ's hurricane response efforts, approximately 500 TCEQ staff were involved in post hurricane landfall response activities. The TCEQ hurricane response activities included:

### **5.1 State Operations Center (SOC) Staffing**

As a member of the State Emergency Management Council the TCEQ was activated to serve at the SOC in Austin, where staff served 24/7 through duration of the hurricane and post hurricane response period.

TCEQ also worked closely with and coordinated with Texas Division of Emergency Management (TDEM) as well as participating in operations at the Federal Emergency Management Agency (FEMA) Joint Field Office.

### **5.2 Unified Command Established**

In responding to the devastation created by Harvey the TCEQ looked to its relationship with other state and federal partners through the Region 6 NDOW. The NDOW partner agencies, the TCEQ, Environmental Protection Agency (EPA), Texas General Land Office and the US Coast Guard, entered immediately into a Unified Command to begin response and recovery operations including:

- Through NDOW's Unified Command structure over 50 field teams were deployed daily throughout three (3) operational branches: Alpha Branch in Corpus Christi, Bravo Branch in Houston, and Charlie Branch in Port Arthur;
- These three (3) operational branches were responsible for covering 58 impacted counties in Texas; and,
- The NDOW field teams conducted Hazard Evaluations, Oil Discharge Assessment and Recovery, Orphan Hazardous Materials Container Evaluation and Recovery, Drinking Water Infrastructure Assessments and Wastewater Infrastructure Assessments.

Because of the pre-planning and coordination among NDOW partner agencies the TCEQ had an ESF-10 Mission Assignment issued quickly by FEMA on August 28, 2017.

Through the early Mission Assignment, FEMA authorized TCEQ to receive over \$15 million in assistance from EPA. Because the Mission Assignment was issued so quickly, most of the FEMA assistance was covered under the 100% reimbursement period.

### **5.3 Public Water Supply (PWS) Assessments and Assistance**

PWS Community Water Systems Tracking (58 Counties within the Governor's Disaster Declaration):

- 2,238 PWS community water systems that serve a population of approximately 11 million people were tracked;
- At the Peak, (between 8/31/17 and 9/4/17), 61 PWS community water systems were either offline or damaged, serving a population of 222,821 people.

TCEQ Assistance Teams staffed with Texas Optimization Program (TOP) staff and engineers, along with EPA staff, were sent to the impacted area to work directly with water system staff at their facilities to expedite the reestablishment of service to their customers. Staff worked 24 hour shifts to provide advanced technical assistance to get plants back online as quickly as possible.

### **5.4 Wastewater Treatment Plants (WWTP) Assessments and Assistance**

WWTP Tracking (58 Counties within the Governor's Disaster Declaration):

- 1,743 Domestic and Industrial WWTPs that serve a population of approximately 10 million people were tracked;
- At the Peak, 40 WWTPs were either offline or damaged on 9/7/17, serving a population of 168,816 people;

Releases of wastewater from sanitary sewers occurred because of the historic flooding, and the agency actively worked to monitor facilities that reported spills.

Additionally, the agency conducted outreach and provided technical guidance to all other wastewater facilities in flood-impacted areas. Assistance teams worked directly with system operators to expedite getting systems back to operational status.

### **5.5 Debris Management**

TCEQ has been approving (providing a temporary authorization) Temporary Debris Management Sites (TDMSs) to help expedite the removal of debris from communities affected by Harvey. Most of the TDMSs were approved within 24 hours or less, with TCEQ staff working seven days a week. These TDMSs are necessary for the debris staging, separation and volume reduction prior to final disposition. TCEQ staff are regularly inspecting these sites to ensure the sites are being managed properly, that appropriate fire protection measures are being addressed, and that the debris is being sent for proper disposal and/or recycling.

As of late March 2018, TCEQ Activities included:

- TCEQ regional offices continue to actively oversee and approve the siting of TDMSs in the affected areas;
  - As of late March, the TCEQ has expedited the approval of 225 TDMSs.
  - 25 of those approved TDMSs remain active.
- The TCEQ continues to visit TDMSs and landfills to ensure compliance with guidelines;
  - As of late March, the TCEQ has conducted 2,186 TDMS inspections.
- Working with the landfills to issue Temporary Authorizations (TAs) to help them handle the tremendous volume of storm debris that needs to be disposed. Those TAs included:
  - TCEQ granting TAs to 25 landfills and four (4) Transfer Stations in the impacted counties that requested to operate 24/7 to help expedite the processing and disposal of storm debris (TAs are granted for up to 180 days and TCEQ can extend them for an additional 180 days); and,
  - TCEQ granting TAs to three (3) landfills requesting to stage waste above their currently permitted height for up to 360 days in order to accommodate the excess storm debris. At some point prior to the expiration of the TAs, the waste must be permanently disposed of within the existing permitted space, or they will need to modify their permit to leave the waste in place above their current permitted vertical height.
- Teaming up with Texas Department of Transportation (TxDOT) to identify communities that were struggling with debris removal. TCEQ worked to identify those areas that needed assistance, and provided the necessary approvals for TDMSs and coordinated through the Disaster District Chairs, TDEM and the SOC. TxDOT provided the equipment and additional manpower for the debris work;
- The TCEQ and the EPA also released fact sheets in English, Spanish, and Vietnamese on best practices when dealing with debris in damaged or destroyed homes;
- Approving temporary Burn Authorizations for the burning of vegetative debris in Air-Curtain Incinerators; and,
- Providing “burn guidance” letters to local jurisdictions giving authorizations for burning vegetative materials to help reduce the amount of debris going into landfills.

## 5.6 Hazardous Materials

The TCEQ and EPA, working through NDOW and the Unified Command, conducted hazardous material response and assessment activities as well as Orphan Container Evaluation and Recovery.

The TCEQ and EPA Activities included:

- Conducting response to threatened or actual releases or discharges of hazardous materials:
  - 266 spills or discharges reported or observed and have been responded to appropriately; and,
  - Completing hazardous material spill response recovery and disposal operations.
- Conducting assessments to locate hazardous material orphan drums and containers displaced by the storm;
- Deploying emergency response contractors to characterize, remove and stage for disposal orphan drums and containers, and their contents;
- 1,155 hazmat orphan drums and containers have been recovered; and,
- Completing hazardous material orphan drum and container recovery and disposal operations.

## 5.7 Air Quality Monitoring

The TCEQ used every appropriate means of air monitoring available to support our mission to protect human health and the environment.

One of the many preparations for Harvey included the TCEQ, the EPA, and other monitoring entities temporarily shutting down several air monitoring stations from the greater Houston, Corpus Christi, and Beaumont areas to protect valuable equipment from storm damage.<sup>1</sup>

After the storm passed, TCEQ staff and contractors began conducting damage assessments of monitoring stations and bringing monitors back online as soon as possible. Monitoring stations not damaged from Harvey were back to operational status in Corpus Christi, Houston, and Beaumont by September 2, 6, and 8, respectively.

By September 29, the stations damaged by Harvey were repaired or replaced and the TCEQ's air monitoring network was restored to 100% operational status.

In a coordinated effort to monitor storm-impacted areas, both TCEQ and EPA investigators spent numerous hours, both day and night, monitoring neighborhoods and

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<sup>1</sup> In Section 4.5.1.2 of the TCEQ Continuity of Operations Plan (COOP), as required by Texas Labor Code § 412, there is a list of hurricane pre-landfall actions for securing capital physical assets including air monitoring equipment.

industrial fence lines with hand-held instruments, such as optical gas imaging cameras (OGIC), toxic vapor analyzers, summa canisters, and portable multi-gas monitors. The use of these tools allows for the most effective source identification for drifting volatile organic compound (VOC) plumes so that swift action can be taken to address the cause of these emissions.

Additional Harvey related air monitoring activities included:

- TCEQ conducting aerial surveys in the Houston and Beaumont areas using a helicopter equipped with an OGIC that can image VOCs and other hydrocarbons invisible to the eye;
- EPA's Airborne Spectral Photometric Environmental Collection Technology (ASPECT) aircraft conducted real-time sampling of potential emission targets over facilities impacted by Harvey;
- EPA's Trace Atmospheric Gas Analyzer (TAGA) mobile monitoring system conducted air quality analyses in neighborhoods surrounding facilities impacted by Harvey; and,
- Results from the available air monitoring data collected from August 24 through September 24, (i.e. continuous air monitors, hand-held instruments, ASPECT and TAGA) all measuring air toxics concentrations below levels of health concern.

### **5.8 Refinery Facility Status**

TCEQ verified and reported on the operational status of refinery and petrochemical facilities:

- Of the 17 facilities being tracked along the Texas coast, all have returned to full operation status.

### **5.9 Superfund Site Assessments**

The TCEQ partnered with the EPA to assess Superfund sites in Texas.

- State Superfund sites in the affected areas in Texas: 17
  - TCEQ completed assessments at all state Superfund sites in the affected areas;
  - Based on the assessment and sampling, all sites were cleared; and,
  - After the assessments a sheen was observed downgradient of the International Creosoting site in Brakes Bayou, which has been contained. TCEQ will continue to oversee these activities.
- Federal Superfund sites in the affected areas in Texas: 34
  - EPA completed site assessments at all 34 Superfund sites in the affected areas;
  - Based on the assessment and sampling, 33 were cleared; and,
  - The San Jacinto Waste Pits site (Site) required additional follow up.

- The Record of Decision for San Jacinto Waste Pits was signed on October 11, 2017, and the EPA’s selected remedy of removal of the contaminated material is described in that document.

### **5.10 Dam Safety Assessments**

The TCEQ contacted 340 high and significant hazard dams in the impacted areas:

- Of those, 20 dams reported sustaining varying degrees of damage from Hurricane Harvey:
  - Nine (9) of those dams were high or significant hazard non-exempt dams;
  - 11 of those dams were significant hazard exempt dams (All of them are exempt from TCEQ regulations); and,
- There were no reports of downstream damage or loss of life.

### **5.11 Outreach to Local Officials**

TCEQ staff reached out to County Emergency Management Coordinators, County Judges, and Mayors to offer assistance and guidance with hurricane and flood related activities including:

- Authorizations for TDMSs;
- Burn guidance; and,
- Animal carcass issues.

TCEQ conducted outreach directly to public drinking water facilities and wastewater facilities to offer technical assistance and guidance to operators.

### **5.12 Information Dissemination**

A vast amount of regulatory guidance, support material, and useful information is on the TCEQ’s Hurricane Harvey Response link<sup>2</sup> available on our main web page.<sup>3</sup>

TCEQ also distributed a Flyer titled “Resources for Texas Residents in the Aftermath of Hurricane Harvey” to assist impacted residents.

## **6.0 After Action Review**

On November 17, 2017, an AAR was conducted to discuss TCEQ’s response to Harvey. Prior to the meeting staff were asked to provide comments about the response that would be discussed during the AAR. The topics discussed during the AAR are listed on the next page:

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<sup>2</sup> <https://www.tceq.texas.gov/home-page/response/hurricanes>

<sup>3</sup> <https://www.tceq.texas.gov>

What went well?	Why?
<p>The Disaster Response Strike Team (DRST) members integrated well, it did not matter what region or discipline they were from.</p>	<ul style="list-style-type: none"> <li>Continued training helped DRST staff fill required Incident Command System (ICS) rolls as needed.</li> <li>Continued training on Response Manager ensured that most DRST staff were familiar with the program.</li> </ul>
<p>Staff from numerous regions, offices and agencies worked together to accomplish the final goal.</p>	<ul style="list-style-type: none"> <li>Continued participation in the NDOW ensures that TCEQ works well with both state and federal response partners.</li> <li>Pre-disaster internal communications were good and ensured everyone was up to date on the current situation.</li> <li>The EPA provided a staff member designated to assisting the TCEQ in obtaining federal assets and support.</li> <li>Assistance from the Military Civil Support Teams and the Texas State Guard Engineering Unit was very helpful.</li> <li>Having a water/wastewater and waste/debris liaison increased efficiency.</li> <li>Having the TCEQ Assistance Teams staffed with Texas Optimization Program (TOP) staff and engineers, who worked directly with the water system staff at their facilities to expedite the reestablishment of service to their customers was extremely helpful. Staff worked 24 hour shifts to provide advanced technical assistance to get plants back online as quickly as possible.</li> <li>The ability of IRD to provide staff and support for the duration of the response ensured all computer systems</li> </ul>



	<p>were maintained and operational at all times.</p> <ul style="list-style-type: none"> <li>• Executive Management participation in all conference calls and meetings was very helpful.</li> </ul>
Posting Harvey information resources online was very helpful.	<ul style="list-style-type: none"> <li>• Providing disaster related information on the public website allowed staff to refer the public, regulated entities, local government officials and media, to a specific location for information.</li> <li>• The ShareNet Office webpages contained useful information for staff responding to Harvey.</li> </ul>
The support provided to the impacted Regional Offices was very helpful.	<ul style="list-style-type: none"> <li>• Immediate authorization to implement Regional Hurricane Plans expedited the response process.</li> <li>• OCE support with media inquiries helped to relieve some of the duties from the regions.</li> <li>• Support from other regions, i.e. transferring affected region's phone lines, responding to affected region's complaints and other routine business, helped insure continuity of operations.</li> </ul>

What can be improved?	How?
<p>Disaster Documentation:</p> <ul style="list-style-type: none"> <li>• Emails for timekeeping were confusing.</li> <li>• The timekeeping process is confusing and time consuming.</li> <li>• The daily 0900 cost tracking deadline is hard to comply with.</li> <li>• Staff need more training on properly completing the ICS 214b.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop or assign a workgroup to revise/update the TCEQ cost tracking documentation procedures.</li> <li>• Training on the completion of 214s is included in the NDOW Response Manager trainings. The training has been revised by the United States Coast Guard.</li> </ul>

<p>Response Manager:</p> <ul style="list-style-type: none"> <li>Several procedural and software issues have been identified, mostly related to the water and wastewater module.</li> </ul>	<ul style="list-style-type: none"> <li>A workgroup to address Response Manager issues has been created. The workgroup will work to revise/update the system's Operating Procedures and fix issues within the software. The first workgroup meeting was held 2/6/18.</li> <li>Continue with Response Manager trainings. Include all TCEQ offices in the trainings.</li> </ul>
<p>Debris Management Procedures:</p> <ul style="list-style-type: none"> <li>The debris management procedures for review/approval of TDMS locations needs to be updated.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a workgroup to revise/update the TCEQ Debris Management Plan, including guidance for conducting approval reviews for TDMS locations and periodic inspections.</li> <li>Work with local government officials to pre-identify TDMS locations prior to actual disasters.</li> </ul>
<p>Handling of Public Information Requests (PIRs):</p> <ul style="list-style-type: none"> <li>Staff were overwhelmed by PIRs.</li> <li>Lack of TCEQ Public Information Officer (PIO) in the branches hampered consistency in responses.</li> <li>Requests for the same information from multiple people caused a drain on resources.</li> </ul>	<ul style="list-style-type: none"> <li>A TCEQ PIO at each branch would help streamline responses to PIRs.</li> <li>Participation of TCEQ PIOs in the Unified Command would ensure accurate responses to PIRs and ensure consistency in responses by the various response partners operating in the Unified Command.</li> <li>A clearing house for PIRs would help streamline the PIR response process.</li> <li>PIOs in the field could help document response operations which could then be used to inform the public of TCEQ positive actions.</li> </ul>
<p>Discretion and Waiver Guidance:</p> <ul style="list-style-type: none"> <li>Additional guidance to regional staff on discretion and waiver issues would be helpful.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct daily calls for staff fielding questions regarding waivers, to help work through issues and provide consistency application of the guidance.</li> </ul>

<ul style="list-style-type: none"> <li>An email box dedicated to questions from the regulated community would have been helpful.</li> </ul>	<ul style="list-style-type: none"> <li>Setup a dedicated email box for disaster related questions from the regulated community.</li> </ul>
<p>Staffing:</p> <ul style="list-style-type: none"> <li>Develop additional trained staff to backfill TCEQ Command Staff positions.</li> <li>Develop additional trained staff to backfill TCEQ Safety Officers.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a Central Office DRST that can back fill Command Staff positions, as needed.</li> <li>Provide more training for Safety Officers through the NDOW or TDEM.</li> </ul>

## 7.0 Improvement Actions

The following AAR improvement actions were identified:

### 7.1 Disaster Documentation

- Develop or assign a workgroup to revise/update the TCEQ cost tracking documentation procedures.

*[Assigned to OCE/CID/EMST]*

- Provide additional training on completion of ICS forms, including the 214b.

*[Assigned to OCE/CID/EMST]*

### 7.2 Response Manager

- Develop or assign a workgroup to address Response Manager issues and revise/update the system's Operating Procedures.

*[Assigned to OCE and OW - A Response Manager Workgroup has been formed. The first workgroup meeting was held 2/6/18]*

- Continue with Response Manager training. Include all TCEQ Offices in the trainings.

*[Assigned to OCE/CID/EMST]*

### 7.3 Debris Management

- Develop a workgroup to revise/update the TCEQ Debris Management Plan, including guidance for conducting approval reviews for Temporary Debris Management Site (TDMS) locations and periodic inspections.

*[Assigned to OCE and OOW]*

- Work with local government officials to pre-identify TDMS locations prior to actual disasters.

*[Assigned to OCE/Regions, OOW and ED/EAD]*

#### **7.4 Public Information Requests (PIRs)**

- a. Participation of TCEQ PIOs in the Unified Command would ensure accurate responses to PIRs and ensure consistency in responses by the various response partners operating in the Unified Command.

*[Assigned to ED/ACD]*

#### **7.5 Discretion and Waiver Guidance**

- a. Conduct daily calls for staff fielding questions regarding waivers, to help work through issues and provide consistency application of the guidance.

*[Assigned to OCE, OA, OW and OOW]*

- b. Set up a dedicated email box for disaster related questions from the regulated community.

*[Assigned to OCE]*

#### **7.6 Staffing**

- a. Develop a Central Office DRST that can back fill Command Staff positions, as needed.

*[Assigned to OCE/CID/EMST]*

- b. Provide more training for Safety Officers through the NDOW or TDEM.

*[Assigned to OCE/CID/EMST]*

#### **8.0 Past Lessons Learned Applied Forward**

During the May 2015 floods in Texas many local governments did not obtain TCEQ authorizations for their TDMS locations, which resulted in the initial denial of cost recovery claims from FEMA. One of the extenuating circumstances that may have contributed to this issue was that the Presidential Disaster Declaration was issued very late. Many local governments had already conducted debris removal operations thinking federal reimbursement was not possible, and therefore did not seek site authorizations from TCEQ. Ultimately, the TCEQ worked with FEMA to provide authorizations for many of the sites after the event, helping the local governments receive their FEMA Reimbursements.

To address this issue, TCEQ, TDEM and FEMA conducted outreach throughout the state over the past two years through various trainings, workshops, and conferences.

Other lessons learned applied forward include those from Hurricane Ike in 2008:

- The NDOW is a product of lessons learned from Hurricane Ike. NDOW was created in 2009 to improve coordination between state and federal agencies operating under ESFs #3 (Public Works and Engineering) and #10 (Oil and Hazardous Materials Response).
- To add depth to the agency's sustained response capabilities the TCEQ developed 16 DRSTs, one in each of the agency's 16 regions, which form the basis of the agency's

disaster response and provide support for local jurisdictions to address emergency and disaster situations. These DRSTs included:

- Over 130 DRST staff members;
  - Staff trained in the National Incident Management System (NIMS) and the Incident Command System (ICS) (ICS-100, 200, 300, 400, 700, 800 certificates) and other disaster-response protocols; and,
  - Teams comprised of regional staff from various disciplines (air, waste, water).
- Development of a TCEQ Hurricane Plan and Debris Management Plan.

# Legend of Acronyms

AAR	After Action Review
ACD	Agency Communications Division
ASPECT	Airborne Spectral Photometric Environmental Collection Technology
CID	Critical Infrastructure Division
COOP	Continuity of Operations Plan
DRST	Disaster Response Strike Team
EAD	Environmental Assistance Division
ED	Executive Director
EPA	Environmental Protection Agency
EMP	Emergency Management Plan
EMST	Emergency Management Support Team
ESF	Emergency Support Function
FEMA	Federal Emergency Management Administration
ICS	Incident Command System
IRD	Information Resources Division
NDOW	Natural Disaster Operational Workgroup
NIMS	National Incident Command System
OA	Office of Air
OCE	Office of Compliance and Enforcement
OGIC	Optical Gas Imaging Camera
OOW	Office of Waste
OW	Office of Water
PIO	Public Information Officer
PIR	Public Information Request
PWS	Public Water System
SOC	State Operations Center
TA	Temporary Authorization
TAGA	Trace Atmospheric Gas Analyzer
TCEQ	Texas Commission on Environmental Quality
TDEM	Texas Division of Emergency Management
TDMS	Temporary Debris Management Site
TGLO	Texas General Land Office
TOP	Texas Optimization Program
TxDOT	Texas Department of Transportation
USCG	United States Coast Guard
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant

## **REFERENCE MATERIALS**

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Human health risk assessment depends on appropriate exposure assessment to accurately characterize health risk/hazard. By definition, chemical exposure requires *contact* of a chemical with the outer boundary of an organism (USEPA 1992, 2016a). Accordingly, exposure is quantified as *the concentration of the agent in the medium in contact*; that is, as the chemical concentration in the air in contact with people. A representative exposure concentration must be used to accurately characterize human health risk/hazard. USEPA (1992) defines exposure concentration as the concentration of a chemical in its transport or carrier medium [air in this case] *at the point of contact*.

- Exposure is measured at the point of human contact.

The strength of measuring exposure at the point of contact is that *it measures human exposure directly* for the most likely accurate exposure value (USEPA 1992). For people living and breathing at ground level, this means that the representative exposure concentrations required to accurately characterize their health risk/hazard are the ground-level concentrations to which they are exposed (or would be exposed if in the area). Consequently, data characterizing ground-level chemical concentrations to which people are actually exposed are entirely relevant and desired for human health risk assessment.

- Ground-level (i.e., point of contact) chemical concentrations to which the public are (or can be) exposed are the relevant dose metric for the assessment of human health risk.

Consistent with this practice for the evaluation of data from a human health perspective, USEPA (1992) states, “*When exposures are being evaluated to determine whether they exceed an action level or other benchmark, point-of-contact measurements are the most relevant data.*” Also consistent, USEPA air sampling probe height criteria for NAAQS chemicals such as PM, lead, ozone precursors (e.g., VOCs), carbonyls (e.g., school air toxics program), metals, and PAHs are from 2-3 meters to no more than 15 meters above the ground (USEPA 1998, 2009, 2016b, 2017). Additionally, the Agency for Toxic Substances and Disease Registry (ATSDR) has indicated that ambient air samples should be collected in the breathing zone *where people may be exposed* to support public health assessments (<https://www.atsdr.cdc.gov/ednpha.html#ambient>).

By contrast, data for air to which the public is not exposed (e.g., air at significant elevation) are not relevant to an assessment of their health risk/hazard. Consistent with this fact, USEPA (1992) states, “*Media [air in this case] measurements taken close to the point of contact with the individual(s) in space and time are preferable to measurements far removed geographically or temporally.*”

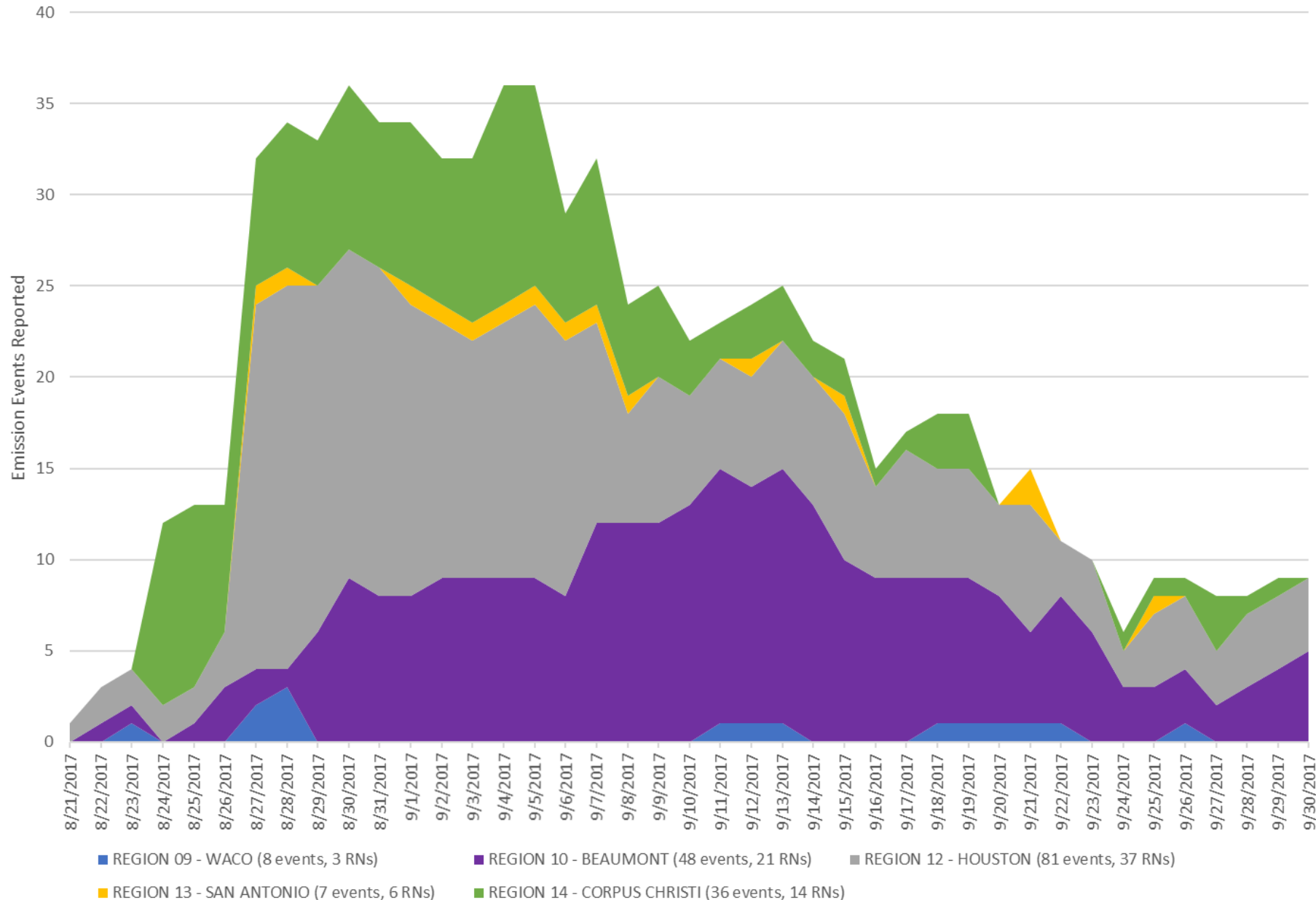
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REPORTED EMISSION EVENTS IN HARRIS COUNTY, AUG 21 - SEP 30, 2017

City	Facility	VOC (lbs)	VOC % of total event emissions																																												
				21-Aug	22-Aug	23-Aug	24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	30-Aug	31-Aug	1-Sep	2-Sep	3-Sep	4-Sep	5-Sep	6-Sep	7-Sep	8-Sep	9-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep	15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep			
BAYTOWN	1	257,195	35%																																												
BAYTOWN	1	131	54%																																												
BAYTOWN	2	10,577	100%																																												
BAYTOWN	2	2,477	40%																																												
BAYTOWN	3	43,392	12%																																												
BAYTOWN	3	58,999	32%																																												
BAYTOWN	3	-	0%																																												
CHANNELVIEW	4	2,872	35%																																												
CHANNELVIEW	4	346	100%																																												
CHANNELVIEW	4	103	100%																																												
CHANNELVIEW	4	-	0%																																												
CROSBY	5	4,747	35%																																												
CROSBY	5	2,138	74%																																												
CROSBY	5	9,699	29%																																												
CROSBY	5	7,124	30%																																												
CROSBY	5	4,867	40%																																												
DEER PARK	6	54,865	81%																																												
DEER PARK	6	64,466	100%																																												
DEER PARK	6	714	87%																																												
DEER PARK	6	14	100%																																												
DEER PARK	7	114	100%																																												
GALENA PARK	8	2,172,037	88%																																												
HOUSTON	9	1,646	47%																																												
HOUSTON	9	200	100%																																												
HOUSTON	9	2,132	95%																																												
HOUSTON	10	331,440	100%																																												
HOUSTON	11	-	0%																																												

Facilities Reporting Emission Events in the Coastal/East/Central Area, Aug 21 - Sep 30, 2017

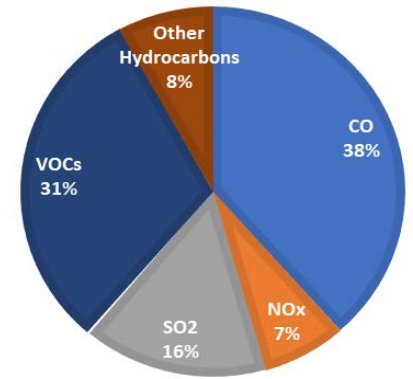
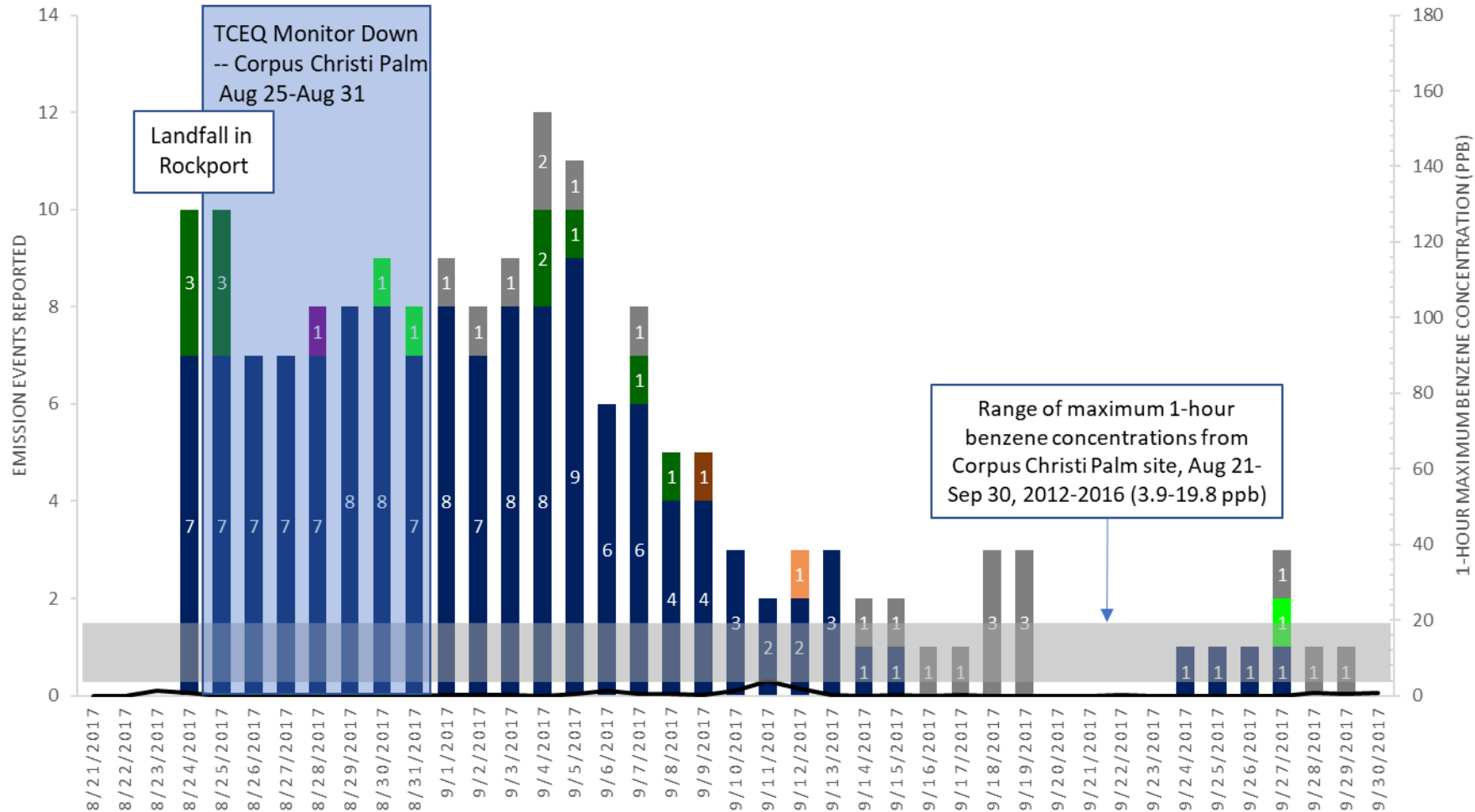


As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

The figure to the left provides the number of reported events per day from August 21 – September 30, 2017. In this date range, there were a total of 179 reported emission events, including events categorized as startup, shutdown, and upsets and opacity events. The number of events and the number of RNs reporting an event within each region are provided in the legend. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days.

# FACILITIES REPORTING AN EMISSION EVENT IN THE CORPUS CHRISTI REGION AND AMBIENT BENZENE CONCENTRATIONS, AUG 21 - SEP 30, 2017

■ CORPUS CHRISTI (17 events, 8 RNs)   ■ POINT COMFORT (6 events, 1 RN)   ■ SEADRIFT (2 events, 1 RN)  
 ■ WESTHOFF (1 event, 1 RN)   ■ YORKTOWN (1 event, 1 RN)   ■ WHITSETT (1 event, 1 RN)  
 ■ VICTORIA (8 events, 1 RN)   — Daily Max 1-Hr Benzene Concentration



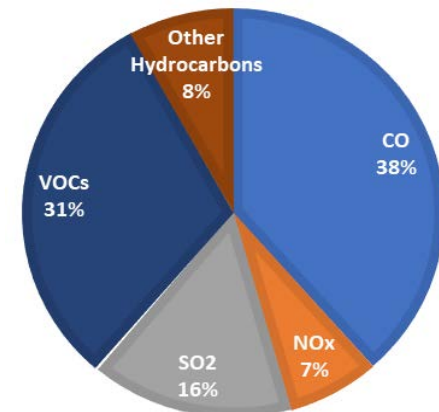
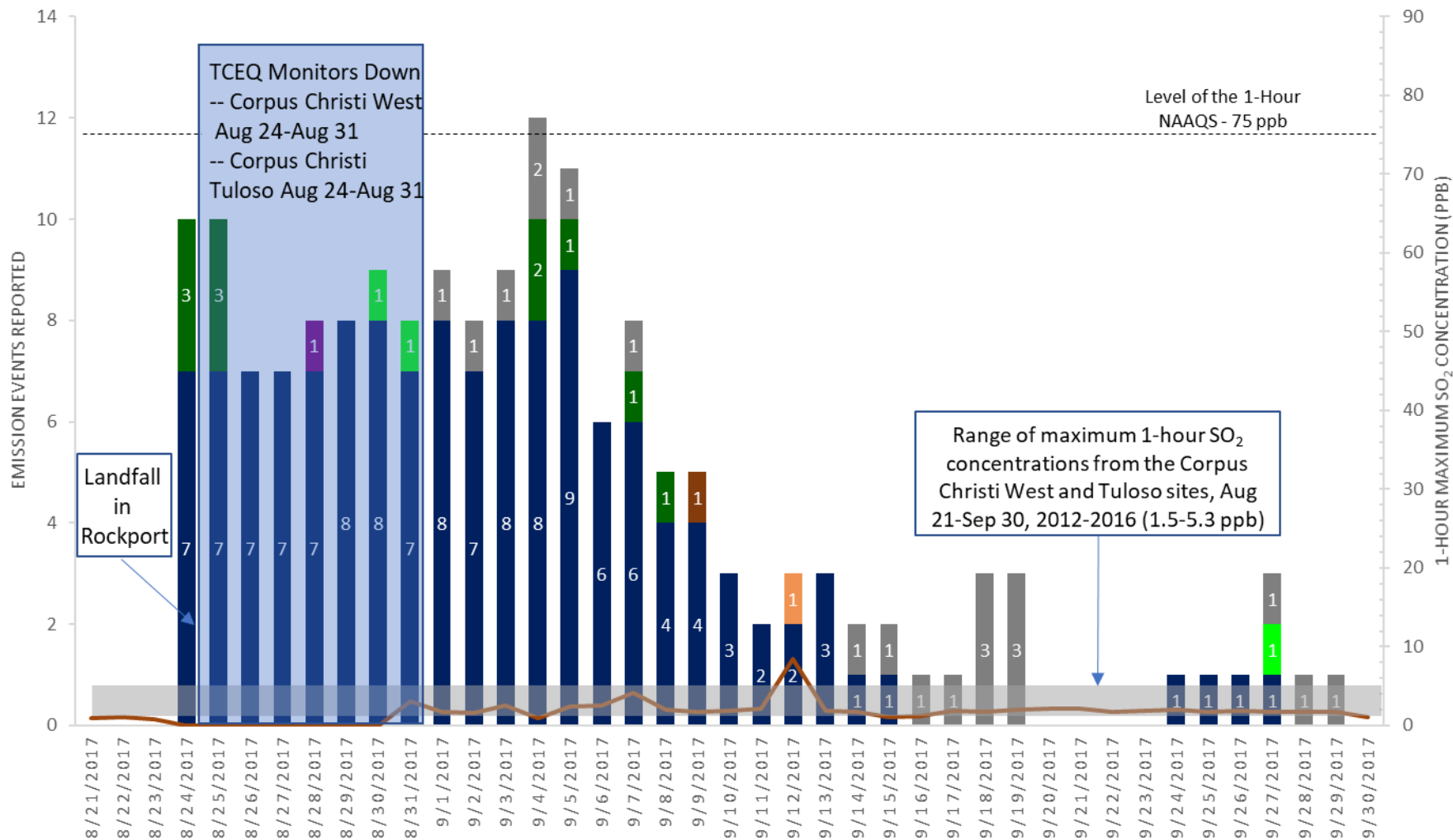
As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

The pie chart above indicates the percentage of each category of emissions reported in the Corpus Christi region from August 21 – September 30, 2017. Opacity events were not included in this analysis.

The stacked bar chart to the left provides the number of reported events per day from August 21 – September 30, 2017. The number of events includes events categorized as startup, shutdown, and upsets and includes opacity events. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days. The line provides the maximum 1-hour benzene concentration measured from region monitors on each day. The range of maximum benzene concentrations for the same date range over the last 5 years from the same monitors is provided for context.

# FACILITIES REPORTING AN EMISSION EVENT IN THE CORPUS CHRISTI REGION AND AMBIENT SULFUR DIOXIDE CONCENTRATIONS, AUG 21 - SEP 30, 2017

■ CORPUS CHRISTI (17 events, 8 RNs) ■ POINT COMFORT (6 events, 1 RN) ■ SEADRIFT (2 events, 1 RN) ■ WESTHOFF (1 event, 1 RN)  
 ■ YORKTOWN (1 event, 1 RN) ■ WHITSETT (1 event, 1 RN) ■ VICTORIA (8 events, 1 RN) ■ Daily Max 1-Hr SO<sub>2</sub> Concentration



As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

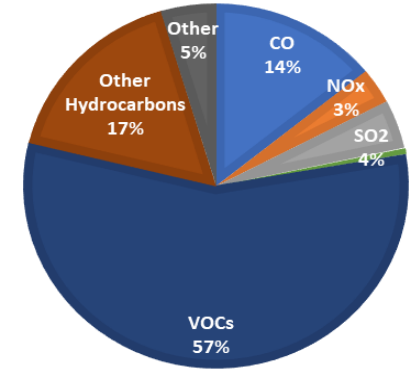
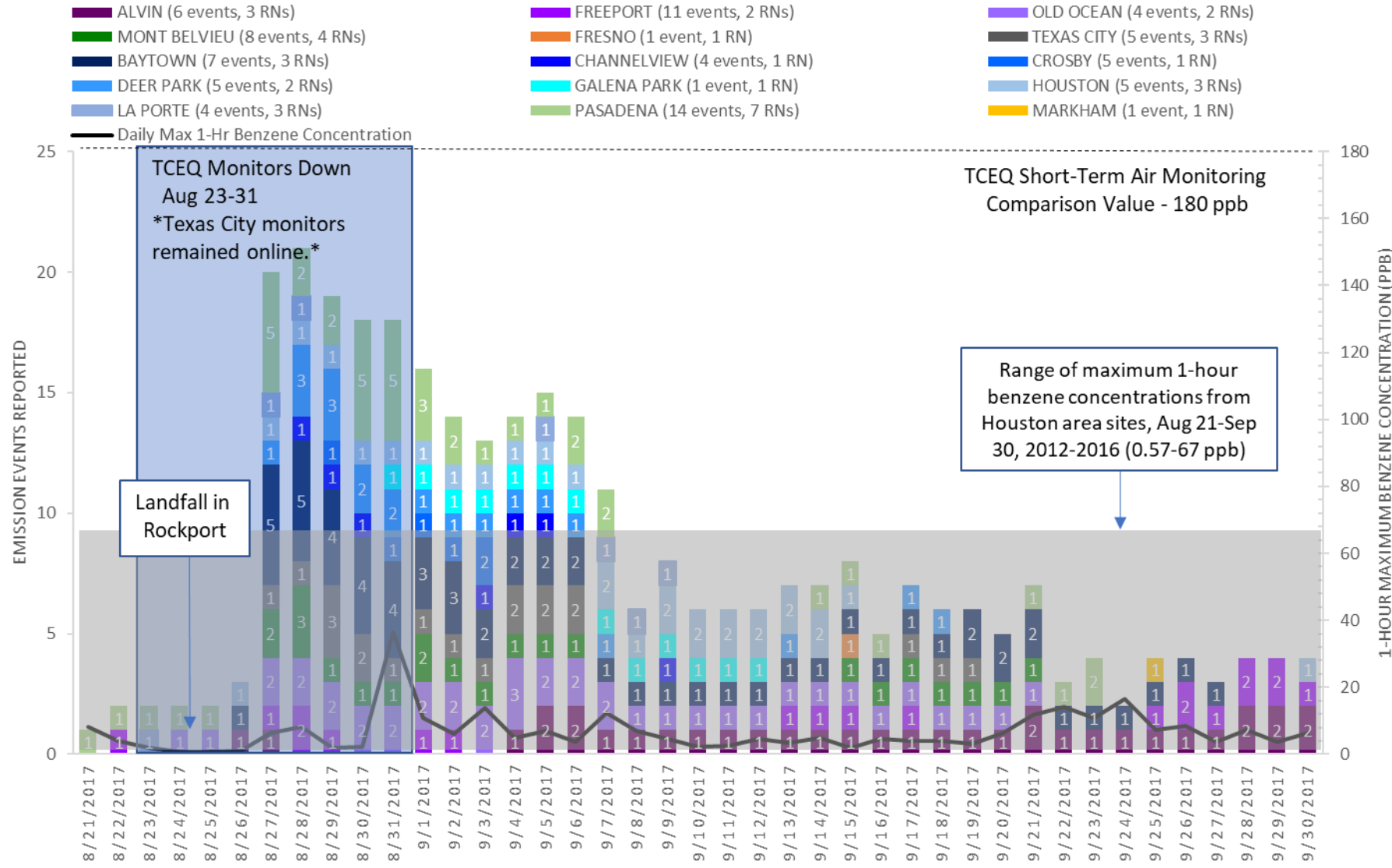
The pie chart above indicates the percentage of each category of emissions reported in the Corpus Christi region from August 21 – September 30, 2017. Opacity events were not included in this analysis.

The stacked bar chart to the left provides the number of reported events per day from August 21 – September 30, 2017. The number of events includes events categorized as startup, shutdown, and upsets and includes opacity events. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days. The line provides the maximum 1-hour SO<sub>2</sub> concentration measured from region monitors on each day. The range of maximum SO<sub>2</sub> concentrations for the same date range over the last 5 years from the same monitors is provided for context.

**TCEQ-0040**



# FACILITIES REPORTING AN EMISSION EVENT IN THE HOUSTON REGION AND AMBIENT MAXIMUM BENZENE CONCENTRATIONS, AUG 21 - SEP 30, 2017



As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

The pie chart above indicates the percentage of each category of emissions reported in the Houston region from August 21 – September 30, 2017. Opacity events were not included in this analysis.

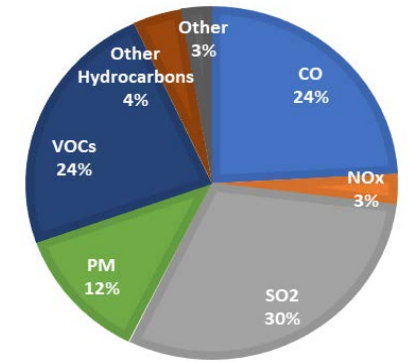
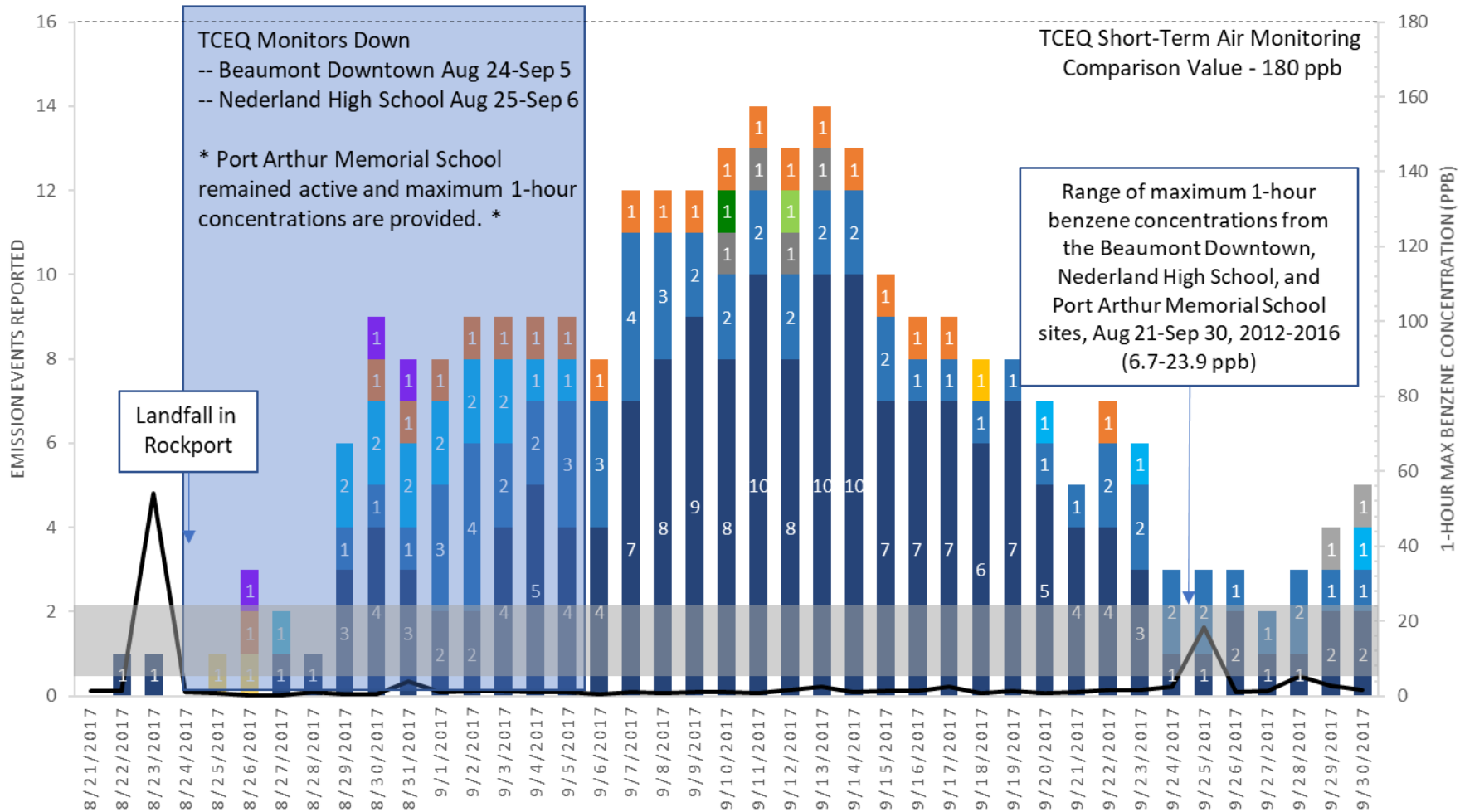
The stacked bar chart to the left provides the number of reported events per day from August 21 – September 30, 2017. The number of events includes events categorized as startup, shutdown, and upsets and includes opacity events. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days. The line provides the maximum 1-hour benzene concentration measured from region monitors on each day. The range of maximum benzene concentrations for the same date range over the last 5 years from the same monitors is provided for context.

**TCEQ-0041**

Monitor Downtime: Danciger (Aug 26-Sep 7), Lake Jackson (Aug 26-Oct 1), Oyster Creek (Aug 25-Sep 16), Texas City 34<sup>th</sup> St (Aug 26-Sep 1), Texas City BP Onsite (Aug 26-Aug 30), Cesar Chavez (Aug 24-Sep 1), Channelview (Aug 24-Sep 5), Clinton (Aug 23-Sep 1), Galena Park (Aug 24-Aug 31), Deer Park (Aug 24-Aug 31), Haden Rd (Aug 24-Aug 30), Milby Park (Aug 24-Sep 11), Wallisville Rd (Aug 26-Aug 31)

# FACILITIES REPORTING AN EMISSION EVENT IN THE BEAUMONT REGION AND AMBIENT MAXIMUM BENZENE CONCENTRATIONS, AUG 21 - SEP 30, 2017

PORT ARTHUR (22 events, 4 RNs)    PORT NECHES (8 events, 4 RNs)    BEAUMONT (6 events, 4 RNs)    HARDIN COUNTY (1 event, 1 RN)  
 SOUR LAKE (1 event, 1 RN)    JASPER (1 event, 1 RN)    EVADALE (1 event, 1 RN)    DIBOLL (1 event, 1 RN)  
 CAMDEN (1 event, 1 RN)    ORANGE (3 events, 2 RNs)    PINELAND (3 events, 1 RN)    Daily Max 1-Hr Benzene



As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

The pie chart above indicates the percentage of each category of emissions reported in the Beaumont region from August 21 – September 30, 2017. Opacity events were not included in this analysis.

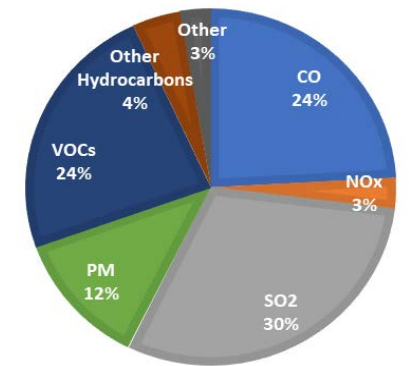
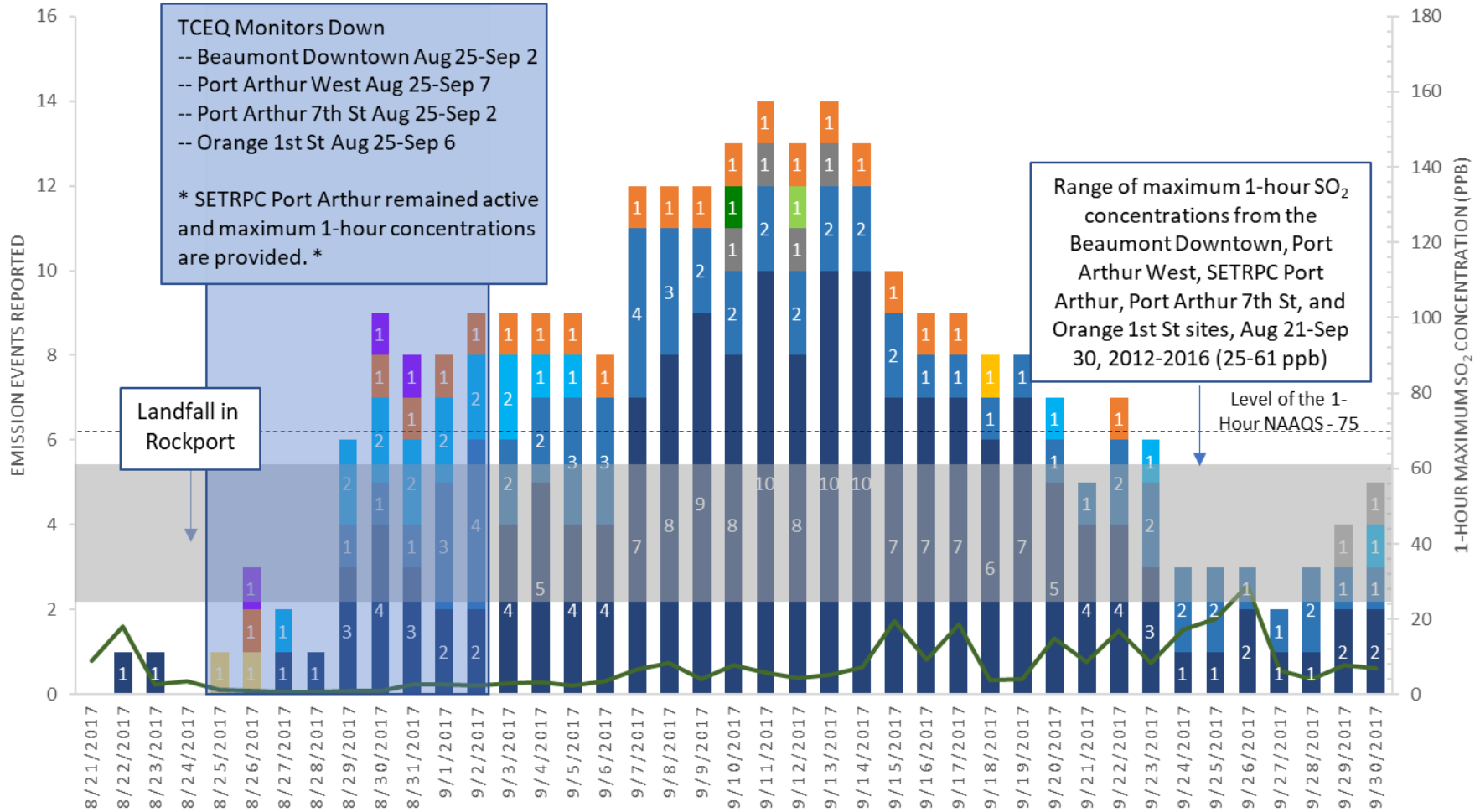
The stacked bar chart to the left provides the number of reported events per day from August 21 – September 30, 2017. The number of events includes events categorized as startup, shutdown, and upsets and includes opacity events. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days. The line provides the maximum 1-hour benzene concentration measured from region monitors on each day. The range of maximum benzene concentrations for the same date range over the last 5 years from the same monitors is provided for context.

TCEQ-0042



# FACILITIES REPORTING AN EMISSION EVENT IN THE BEAUMONT REGION AND AMBIENT MAXIMUM SULFUR DIOXIDE CONCENTRATIONS, AUG 21 - SEP 30, 2017

PORT ARTHUR (22 events, 4 RNs)    PORT NECHES (8 events, 4 RNs)    BEAUMONT (6 events, 4 RNs)    HARDIN COUNTY (1 event, 1 RN)  
 SOUR LAKE (1 event, 1 RN)    JASPER (1 event, 1 RN)    EVADALE (1 event, 1 RN)    DIBOLL (1 event, 1 RN)  
 CAMDEN (1 event, 1 RN)    ORANGE (3 events, 2 RNs)    PINELAND (3 events, 1 RN)    Daily Max 1-Hr SO<sub>2</sub>



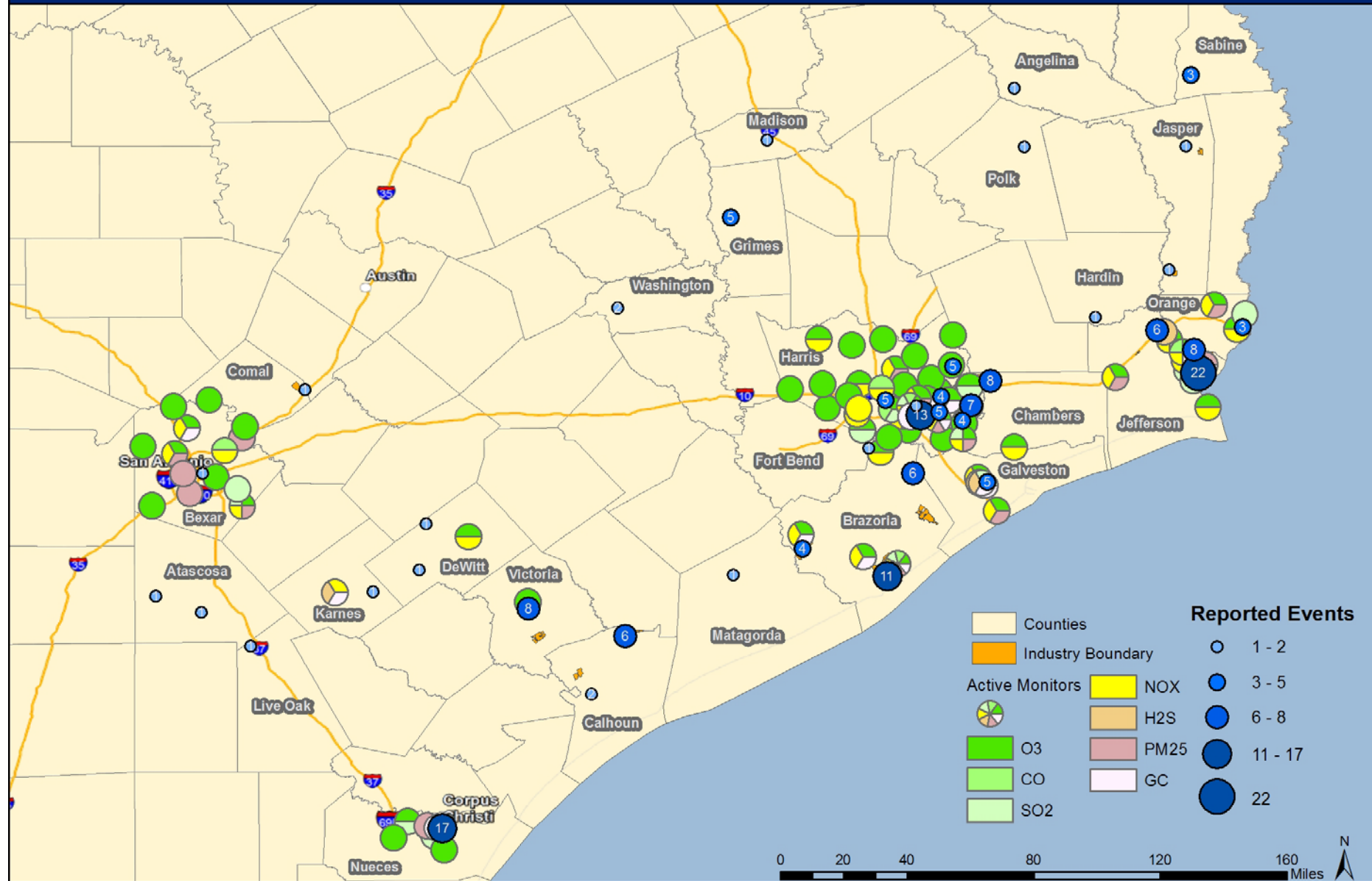
As outlined in 30 TAC 101, air releases exceeding permit authorizations of a reportable quantity are reported to the TCEQ. Total estimated emissions are reported by the RN over the entire event period; therefore, daily emissions are not available. Please see the attached list of caveats for all data limitations.

The pie chart above indicates the percentage of each category of emissions reported in the Beaumont region from August 21 – September 30, 2017. Opacity events were not included in this analysis.

The stacked bar chart to the left provides the number of reported events per day from August 21 – September 30, 2017. The number of events includes events categorized as startup, shutdown, and upsets and includes opacity events. To evaluate temporal changes, these events were split apart by day. For example, an event at Facility A lasting from August 26 – August 28 would be counted as 1 event for each of the 3 days. The line provides the maximum 1-hour SO<sub>2</sub> concentration measured from region monitors on each day. The range of maximum SO<sub>2</sub> concentrations for the same date range over the last 5 years from the same monitors is provided for context.

**TCEQ-0043**

# Facilities Reporting Emissions During Hurricane Harvey: Number of Emission Events Reported from August 21 to September 30, 2017



Texas Commission on Environmental Quality

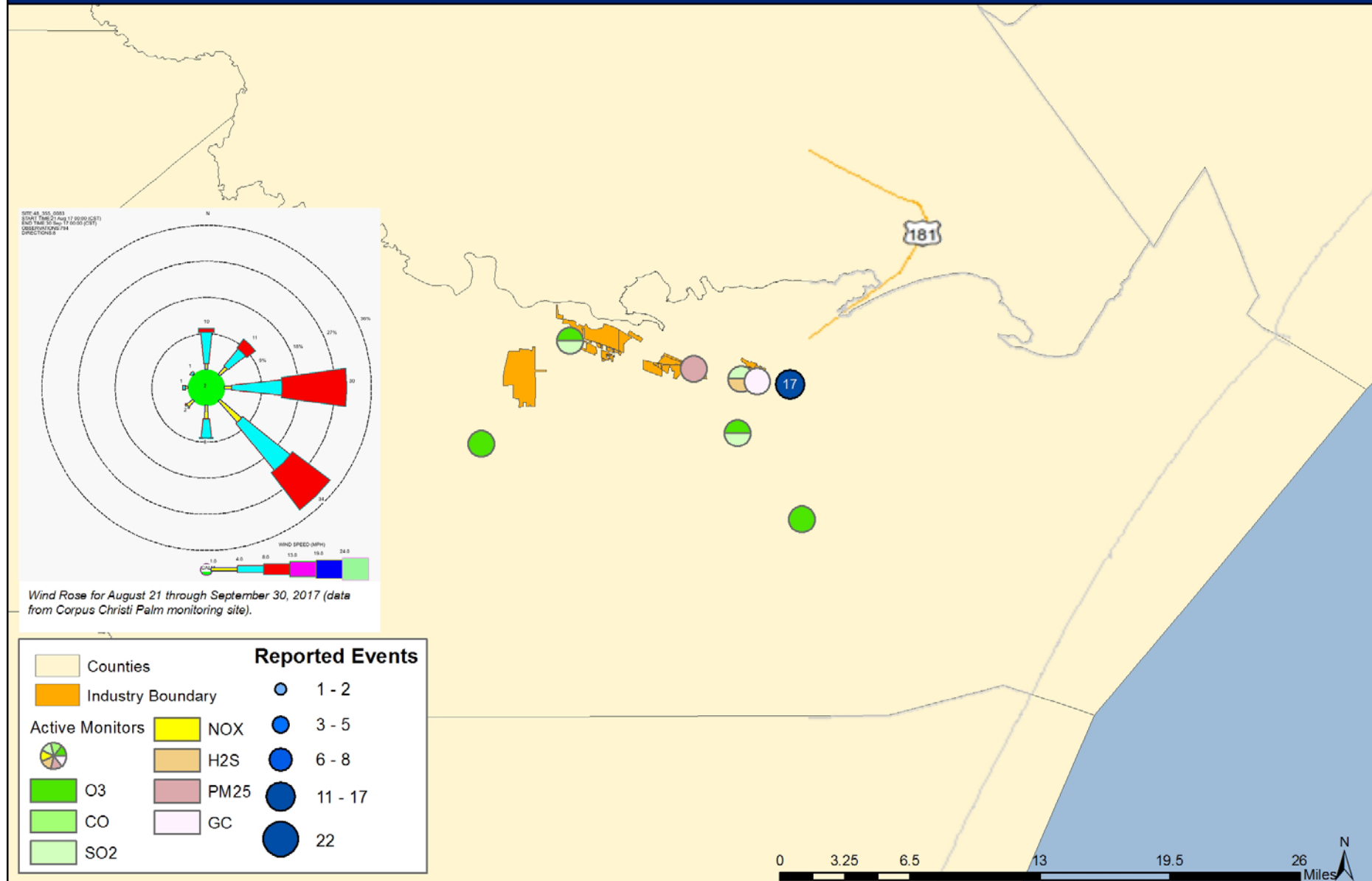
Date Created: 3/2/2018

This map was generated by the Toxicology Division (TD) of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information regarding this map, please contact the TD at (512) 239-3900.

Reported events are mapped based on the centroid coordinates of the identified nearby city reported in the emission event data. Three emission events did not have a nearby city reported and are not represented in this map (1 in Hardin county and 2 in Atascosa county). Industry boundaries may not exist in this file for all industries reporting emission events during the specified time-frame.

TCEQ-0044

# Facilities Reporting Emissions During Hurricane Harvey in Nueces County: Number of Emission Events Reported from August 21 to September 30, 2017



Texas Commission on Environmental Quality

Date Created: 3/2/2018

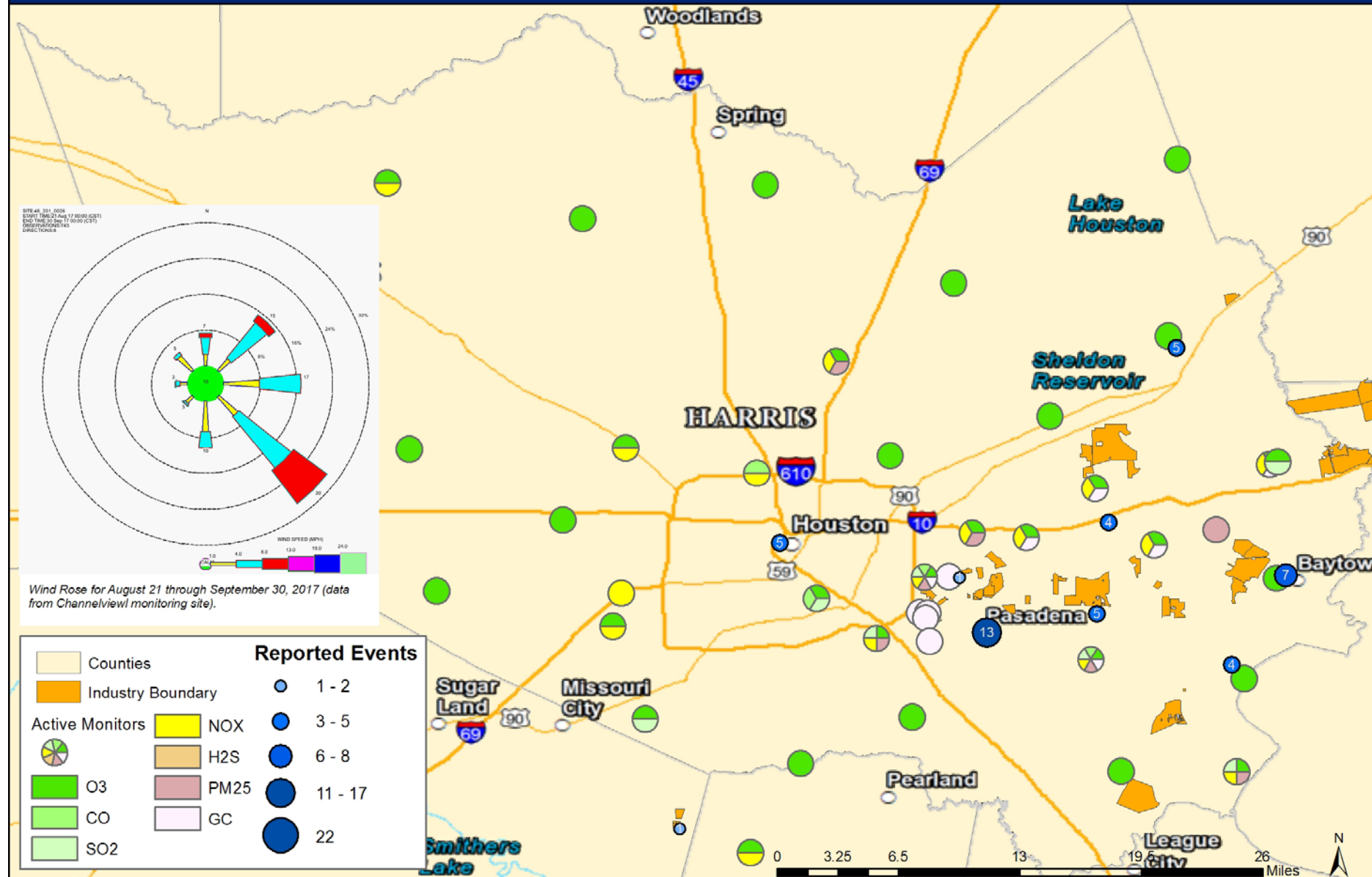
This map was generated by the Toxicology Division (TD) of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information regarding this map, please contact the TD at (512) 239-3900.

Reported events are mapped based on the centroid coordinates of the identified nearby city reported in the emission event data. Three emission events did not have a nearby city reported and are not represented in this map (1 in Hardin county and 2 in Atascosa county). Industry boundaries may not exist in this file for all industries reporting emission events during the specified time-frame.

TCEQ-0045



# Facilities Reporting Emissions During Hurricane Harvey in Harris County: Number of Emission Events Reported from August 21 to September 30, 2017



Texas Commission on Environmental Quality

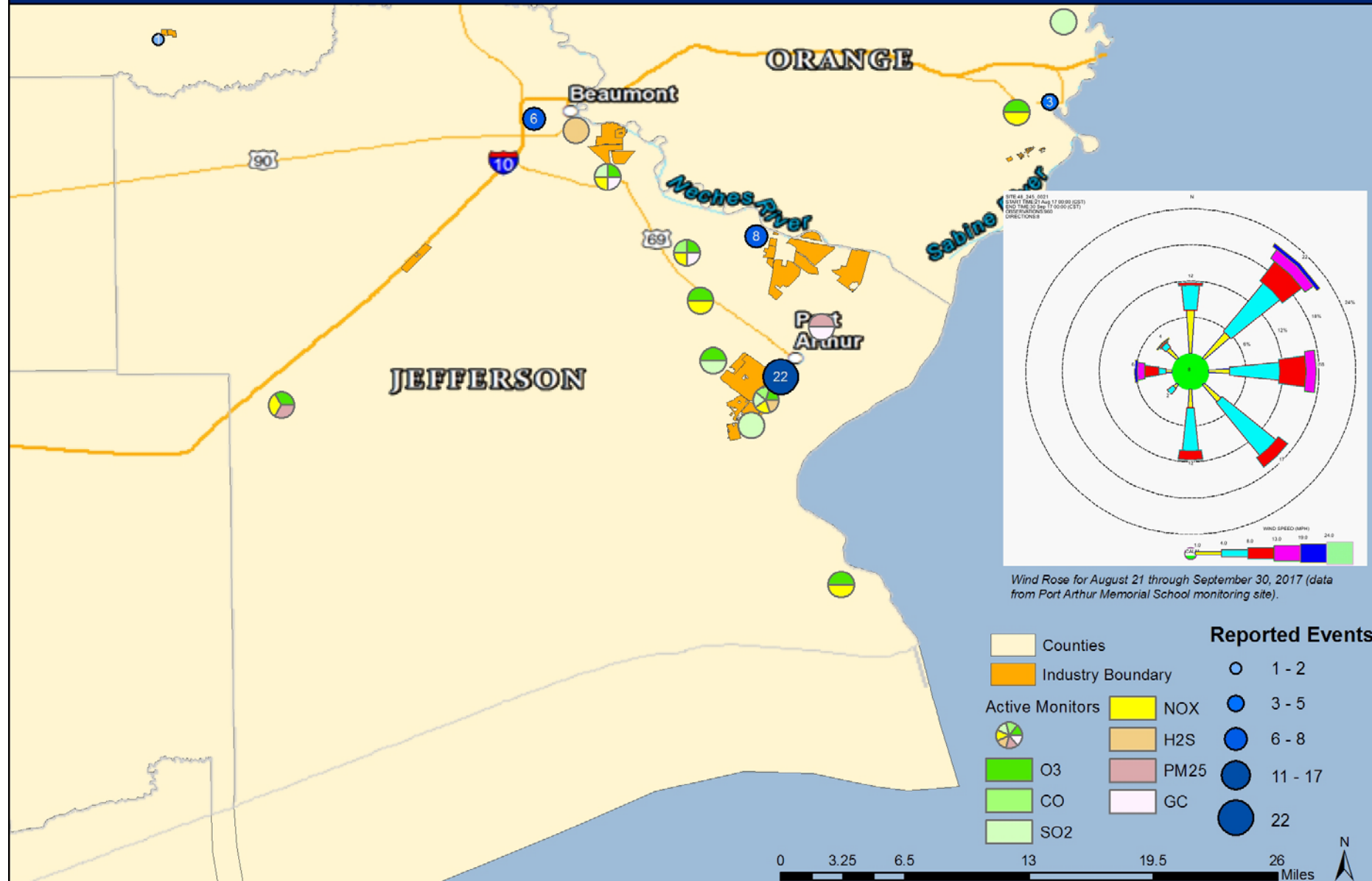
Date Created: 3/2/2018

This map was generated by the Toxicology Division (TD) of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information regarding this map, please contact the TD at (512) 239-3900.

Reported events are mapped based on the centroid coordinates of the identified nearby city reported in the emission event data. Three emission events did not have a nearby city reported and are not represented in this map (1 in Hardin county and 2 in Atascosa county). Industry boundaries may not exist in this file for all industries reporting emission events during the specified time-frame.

TCEQ-0046

# Facilities Reporting Emissions During Hurricane Harvey in Jefferson County: Number of Emission Events Reported from August 21 to September 30, 2017



Texas Commission on Environmental Quality

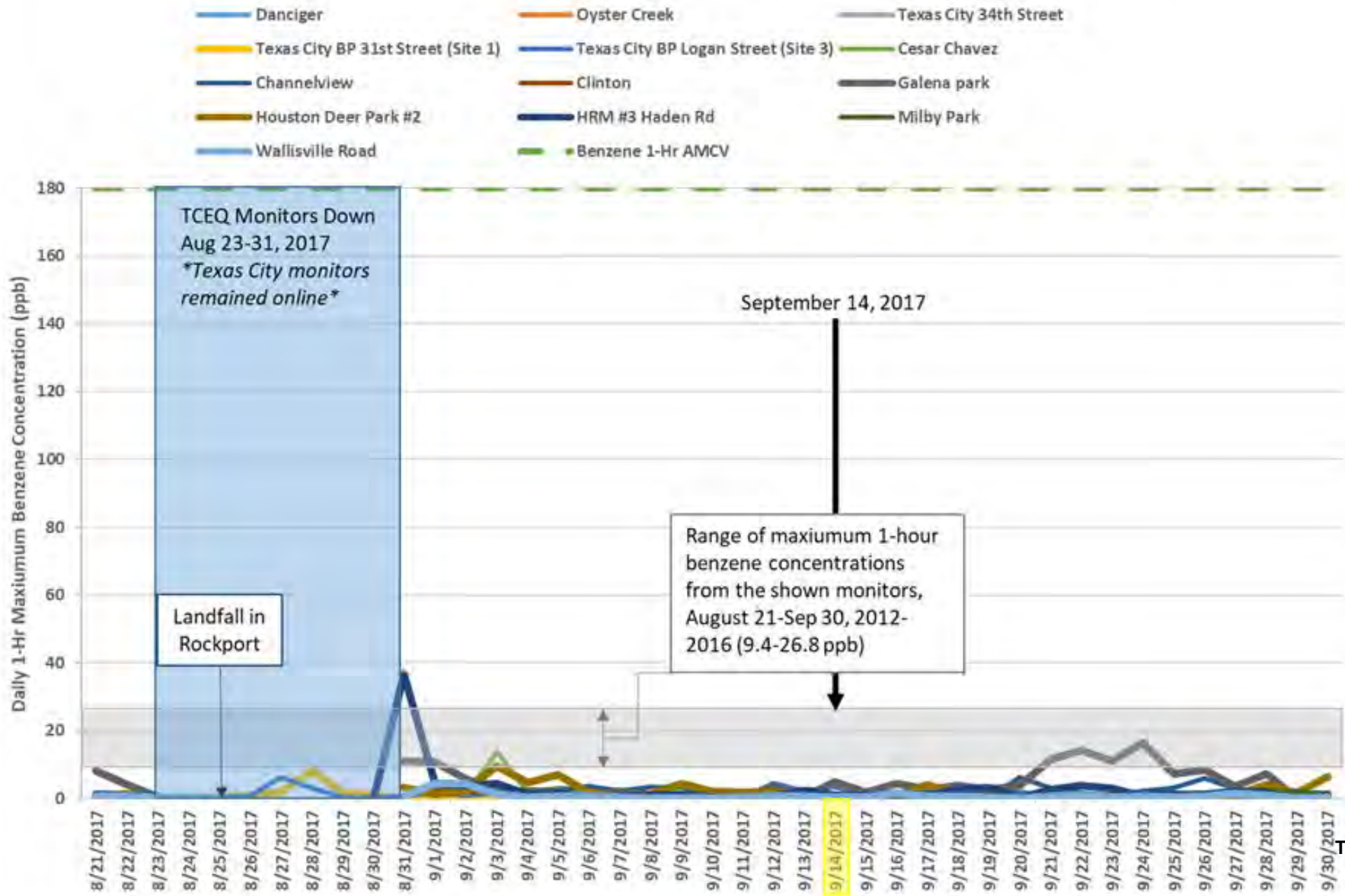
Date Created: 3/2/2018

This map was generated by the Toxicology Division (TD) of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information regarding this map, please contact the TD at (512) 239-3900.

Reported events are mapped based on the centroid coordinates of the identified nearby city reported in the emission event data. Three emission events did not have a nearby city reported and are not represented in this map (1 in Hardin county and 2 in Atascosa county). Industry boundaries may not exist in this file for all industries reporting emission events during the specified time-frame.

TCEQ-0047

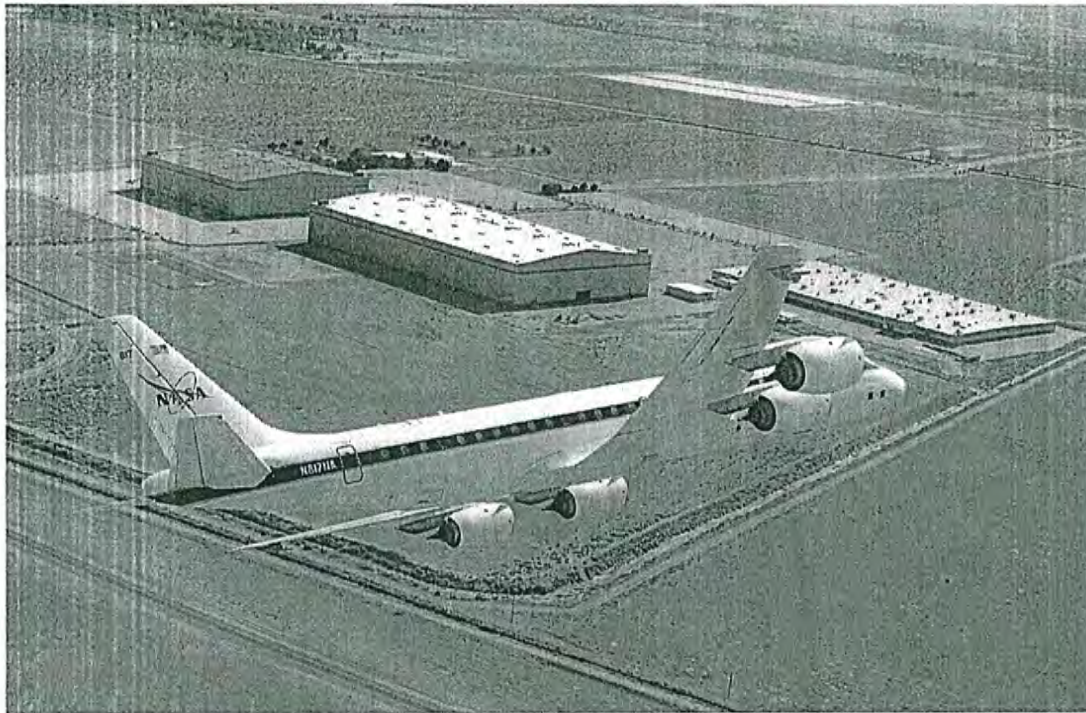
# TCEQ Region 12 (Houston) AutoGC Monitoring Sites 1-Hr Max Benzene Data Post-Harvey (a worst-case summary)







## NASA DC-8 Airborne Laboratory



The DC-8 flies over the Dryden Aircraft Operations Facility, Palmdale, Calif. ED07-0256-13

NASA operates a highly modified McDonnell Douglas DC-8 jetliner as a flying science laboratory. The platform aircraft, based at NASA's Dryden Aircraft Operations Facility, Palmdale, Calif., collects data for experiments in support of scientific projects serving the world's scientific community. Included in this community are NASA, federal, state, academic and foreign investigators.

Data gathered by the DC-8 at flight altitude and by remote sensing have been used for scientific studies in archaeology, ecology, geography, hydrology, meteorology, oceanography, volcanology, atmospheric chemistry, soil science and biology.

The DC-8 flies three primary missions: sensor development, satellite sensor verification and basic research studies of the Earth's surface and atmosphere.

### Sensor Development

Because it flies in the Earth's atmosphere, the DC-8 offers a comparatively inexpensive way to test and verify prototype space shuttle or satellite instruments.

Scientists use the DC-8 to develop ideas in instrument technology, test new instruments and modify them if necessary, based on flight results. Potential problems can be corrected before new instruments are launched into space. As a result, flight-proven hardware can lead to substantial savings in time and resources.

### Satellite Sensor Verification

Once in orbit, satellite instruments may send back billions of bits of data daily. The DC-8 helps scientists answer questions about the accuracy of data obtained and how to interpret it. For these

# NASAfacts



missions the DC-8 flies under a satellite's path, using instruments to compile the same information as that collected by the satellite. Through this process, algorithms used to interpret satellite data are evaluated and updated to reflect the results verified by DC-8 instrumentation.

Despite near-record levels of chemical ozone destruction in the Arctic in January and February 2005, observations from the Aura satellite showed that other atmospheric processes restored ozone amounts to near average and stopped high levels of harmful ultraviolet radiation from reaching Earth's surface. Instruments flown on the DC-8 during NASA's Polar Aura Validation Experiment confirmed the satellite data. The aircraft carried 10 instruments that were used to measure temperature, aerosols, ozone, nitric acid and other gases, as it flew beneath Aura as it passed over the polar vortex.

### **Basic Research Studies**

In 1991, NASA launched a comprehensive program to study the Earth as an environmental system. The DC-8's extended range, prolonged flight-duration capability, large payload capacity and laboratory environment make it one of the premier research aircraft available to NASA's Science Mission Directorate. Combined with other aircraft, satellites or ground stations, the DC-8 complements and extends the range of any instrument package, allowing scientists to successfully address today's planetary issues, including global warming and deforestation.

As part of Arctic ozone experiments, the DC-8 flew in polar regions to collect atmospheric information that may contribute to human understanding of ozone depletion. Teamed with NASA's ER-2 high-altitude research aircraft, the DC-8 participated in the SAGE III Ozone Loss and Validation Experiment, or SOLVE, in Kiruna, Sweden. The SOLVE mission, which took place during the winter of 1999-2000, was one of the largest NASA-sponsored field campaigns to measure ozone amounts in the Arctic stratosphere. The DC-8 returned to Sweden for SOLVE II in January 2003.

The Convection and Moisture Experiment, or CAMEX, is a series of field research investigations intended to improve understanding and prediction of hurricane activity. The fourth campaign, during the summer of 2001, studied hurricane development, tracking, intensification and landfall. The DC-8 and a NASA ER-2 carried instruments that yielded information about hurricane structure, dynamics and motion.

The Airborne Synthetic Aperture Radar, developed by NASA's Jet Propulsion Laboratory, Pasadena, Calif., is an all-weather imaging device that can penetrate clouds, forest canopies, thin sand and dry snow packs. In early 2004, the sensor was carried on the DC-8 to survey selected sites in Central America to uncover archaeological sites hidden beneath the forest. The aircraft continued on to South America and Antarctica, where it collected data on the contribution of Southern Hemisphere glaciers to a rise in sea level due to climate change.

### **DC-8-72 Aircraft**

The NASA DC-8-72 is a four-engine jet transport aircraft that has been highly modified to support the agency's Airborne Science mission. The aircraft, acquired in 1985, is 157 feet long with a 148-foot wingspan. With a range of 5,400 nautical miles, it can fly at altitudes from 1,000 to 42,000 feet for up to 12 hours, although most science missions average six to 10 hours. The DC-8 can carry 30,000 pounds of scientific instruments and equipment.

Among the aircraft's features are wing pylons for aerosol sampling; a gyro-stabilized pointing and tracking mirror system; a dropsonde delivery tube; atmospheric chemistry sampling probes; and multiple reinforced ports that accept experiments that can be aimed in virtually any direction. Experiment support capabilities include weather radar, an integrated navigation management system, a satellite-based time code generator, a stand-alone Global Positioning System, and a weather satellite receiver system. Each experiment is supported by an information collection and transmission system that provides navigation, aircraft flight conditions and environmental data measured by the aircraft's sensors.

National Aeronautics and Space Administration  
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[www.nasa.gov](http://www.nasa.gov)

FS-2008-02-050-DFRC

NASA Facts

**TCEQ-0050**



## Trace Organic Gas Analyzer (TOGA) Instrument Description

A gas chromatograph/mass spectrometer (GC/MS) instrument will measure volatile organic (VOC) compounds including oxygenated VOCs, non-methane hydrocarbons (NMHCs) and halocarbons listed in Table 1.

Air samples are drawn into the introduction system, via ¼" fused-silica coated stainless steel tubing, where preconcentration occurs. A three-stage trapping sequence is used to prepare the sample prior to separation and detection. Helium carrier gas transfers the preconcentrated compounds to a custom-built, miniaturized gas chromatograph fitted with an HP-624 column. The VOC compounds of interest elute from the column and into the detector, a Hewlett-Packard 5973 mass spectrometer operating in the single ion monitoring mode. The GC/MS method provides unambiguous identification because the compounds are chromatographically separated and mass selected. The limit of detection is less than or equal to 20 pptv for all compounds measured with an uncertainty of  $\leq \pm 20\%$  for all compounds. LODs for specific compounds are listed in Table 2. Sampling frequency will be either 2.0 minutes or 2.5 minutes.

In-flight calibration and zeroing (system blanks) are necessary for quality MS-based VOC measurements. The calibration system consists of a custom-built compressor/zero air generator/dilution system. High-efficiency Teflon diaphragm pumps are used to draw in ambient air. The zero air generator scrubs the air it free of VOCs while maintaining ambient humidity. For calibration, standard alcohol/carbonyl mixtures are added to the scrubbed diluent gas stream. The system is capable of diluting the standard mixtures by factors of 100 to 10,000 and is very accurate because it contains only two, previously calibrated, flow controllers. The zeros and diluted standard samples enter the analytical system near the sampling inlet tip and follow a path identical to the ambient air samples through the analytical system. To help ensure the precision of our VOC measurements we also analyze one or two long-lived CFCs present in the atmosphere during each chromatographic run. By analyzing atmospherically stable compounds such as CFC-11, CFC-12, CFC-113 and carbon tetrachloride - which have retention times within our chromatographic window - we can account for small variations in mass spectrometer response. This augments our on-board analysis of diluted alcohol and carbonyl standards.

**Table 1. TOGA-ARCTAS full compound list**

Compound	Compound
OVOCs	
Methanol	Propanal
Ethanol	Butanal

Acetone	Pentanal
Butanone	2-Pentanone
Methyl tert. Butyl Ether	3-Pentanone
Acetaldehyde	
<u>NMHCs</u>	
Isoprene	Benzene
Propane	Toluene
Butane	Ethyl Benzene
Isobutane	<i>m</i> -Xylene
Pentane	<i>o</i> -Xylene
Isopentane	1,3,5-Trimethylbenzene
1,3-Butadiene	1,2,4-Trimethylbenzene
<u>Halocarbons</u>	
Tetrachloroethylene	CFC-113
Tetrachloromethane	Chloromethane
Chloroform	Methyl Bromide
Methylene Chloride	Methyl Iodide
Chloroacetaldehyde	Chloroacetone
Bromoacetaldehyde	Bromoacetone
<u>Other</u>	
Dimethyl Sulfide (DMS)	Acetonitrile

**Table 2.** Limits of detection and uncertainty for a subset of TOGA-measured compounds

Compound	Quant. Ion	Uncertainty	LOD pptv
i-butane	42	$\leq \pm 20\%$	1.4
Methyl chloride	50	$\leq \pm 20\%$	6
Butane	29	$\leq \pm 20\%$	1.9
Acetaldehyde	29	$\leq \pm 20\%$	6.3
Methyl bromide	94	$\leq \pm 20\%$	0.4
i-pentane	42	$\leq \pm 20\%$	0.8
Methanol	31	$\leq \pm 20\%$	16.9
Pentane	42	$\leq \pm 20\%$	0.8
Isoprene	67	$\leq \pm 20\%$	0.5
Ethanol	45	$\leq \pm 20\%$	16.2
Propanal	58	$\leq \pm 20\%$	1.6
DMS	62	$\leq \pm 20\%$	0.7
Acetone	58	$\leq \pm 20\%$	3.9
Methylene chloride	84	$\leq \pm 20\%$	0.9
Acetonitrile	41	$\leq \pm 20\%$	1.4
MTBE	73	$\leq \pm 20\%$	0.2
MEK	72	$\leq \pm 20\%$	0.7
Chloroform	83	$\leq \pm 20\%$	0.1
Tetrachloromethane	117	$\leq \pm 20\%$	0.2
Benzene	78	$\leq \pm 20\%$	0.3
Toluene	91	$\leq \pm 20\%$	0.1



## The Trace Organic Gas Analyzer (TOGA) - an airborne fast gas chromatograph mass spectrometer for atmospheric chemistry measurements

Daniel D. Riemer, University of Miami, RSMAS, Division of Marine and Atmospheric Chemistry, Miami, Florida  
Eric C. Apel, Alan J. Hills, and Rebecca S. Hornbrook, National Center for Atmospheric Research, Atmospheric Chemistry

## ABSTRACT

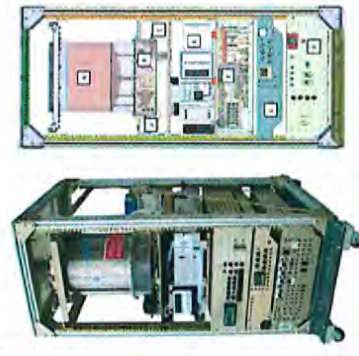
Recently an airborne gas chromatograph mass spectrometer (GC-MS) was developed for atmospheric chemistry research powered by the NSF Gulfstream V (GV) aircraft. The instrument is denoted TOGA-GV (Trace Organic Gas Analyzer) and is an airborne fast GC-MS capable of measuring a suite of volatile organic compounds (VOCs), including: oxygenates (OVOCs), non-methane hydrocarbons (NMHCs), haloaromatics, and nitrogen and sulfur containing species. The compounds are diverse in their range of sources (anthropogenic, biogenic, or a combination thereof), of atmospheric reactivity with OH (minutes (isoprene, terpenes) to years (CFCs)), of loss to photolysis (days (acetaldehyde) to negligible (NMHCs)), and of solubility ( $k_{\text{a}}$  ~  $150$  to  $10^4$ ) and toxicity (formaldehyde, benzene, etc.). The TOGA-GV measures these organic compounds with high accuracy, precision, and low detection limits (~  $10$  ppt to  $< 1$  ppt) at a sampling rate of 2 minutes or less. The instrument is usable throughout the troposphere and lower stratosphere to an altitude of approximately 45 km.

## DESCRIPTION OF RESEARCH INSTRUMENTATION

The TOSA-GV was developed for measuring VOCs on the NSF Gulfstream V research aircraft (Figure 1). The instrument (Figure 2) offers a number of advantages over competing technologies, including: 1) Unparalleled range of VOC measurements in a single-size instrument (Table 1); 2) Reasonable time resolution (2.0 min. or better); 3) High sensitivities with limits of detection at the part per trillion level or lower (Table 2); 4) Functionality at all altitudes within the range of the NSF-GV aircraft; and 5) High selectivity.



**Figure 1.** The NSF Gulfstream V aircraft used for atmospheric chemistry studies has a range of 7,000 miles and can carry 5,600 pounds of sensors. Capable of flying at altitudes as high as 51,000 feet, the Gulfstream V can collect data at the tops of storms and lower edge of the stratosphere, altitudes out of reach of most research aircraft.



**Figure 2.** Photograph and schematic diagram of the TOGA-QV showing the major instrument components: (A)  $\text{LN}_2$  dewar, (B) Heated sample holding and cryogenic enrichment traps, (C) Mass switching valves, (D) Mass spectrometer vacuum chamber, (E) Gas chromatograph, (F) Mass spectrometer, (G) Zero air generator/dilution system, (H) Power box and UPS.

[illegible]

Table 2. Sampling and Detection Limits for the TOGA-GV Instrument.

Compound Class and Compound	Limit of Detection (pg/g)	Instrument Uncertainty
Alkanes		
Acetone	\$5	± 15%
Methanol	\$10	± 20%
Acetaldehyde	\$5	± 15%
All others	\$5	± 15%
Aldehydes		
CH <sub>3</sub> CHO	\$3	± 8%
Alcohols		
CH <sub>3</sub> OH	\$1	± 3%

Detection limits determined at five times the baseline noise. Measurement uncertainty is determined from the error propagation of accuracy and precision; the accuracy is a function of the standard, flow computer calibration (10/20/30), and measurement repeatability. The precision is a function of the standard, flow computer calibration, and measurement repeatability. Measurement uncertainty increases as the limit of detection is approached.

The TOGA-GV offers two-dimensional separation with the gas chromatograph providing the first separation and the mass spectrometer the second, ensuring each organic species measured is uniquely identified and quantified. The instrument is contained in a standard NSF-GV rack, weighs less than 185 kg and consumes ~1.3 kW of power. The major components of the instrument, are the inlet, cryogenic preconcentrator, gas chromatograph, mass spectrometer detector, zero air/calibration gas system, and the control/data acquisition system. All processes and data acquisition are computer controlled. A diagram showing sampling, concentration, and vacuum flows is presented in Figure 3.

### EXAMPLES OF ACTUAL MEASUREMENTS

Figure 4 shows a sample MS ion chromatogram obtained with the TOGA-GV for an air sample obtained during the Deep Convective Clouds and Chemistry (DCC) experiment. The chromatographic run time is 70 seconds with a subset of the total analyzed compounds shown. The corresponding mixing ratios of the compounds in Figure 4 are shown in Table 3. The system was configured to measure a specific 40-compound suite, but is very flexible in terms of which molecules and the total number that can be quantified.

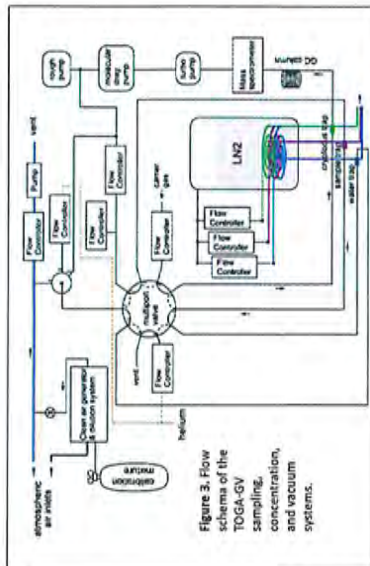


Figure 3. Flow  
schema of the  
TOGA-GV  
sampling,  
concentration,  
and vacuum  
systems.

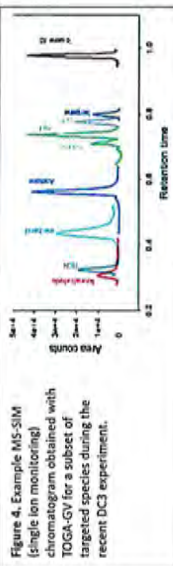


Figure 4. Example MS-SIM (single ion monitoring) chromatogram obtained with TOGA-GV for a subset of targeted species during the recent DC3 experiment.

Compound	Ion (m/z)	Mixing Ratio (ppbv)
Formaldehyde	30	275
HCN	27	217
Methanol	31	1918
Acetone	58	1058
MEK	72	39.4
CCl <sub>4</sub>	117	92
Butanol	72	8.5
Benzene	78	30.2
Toluene	91	2.6

Figure 5 shows example data that were collected by TOSA-GV during the DC3 experiment. On this particular flight, measurements were made within thunderstorm inflow and outflow areas. The aircraft went in and out of the outflow five times as seen in the figure and we observed enhancements of all VOCs over background in the thunderstorm outflow.

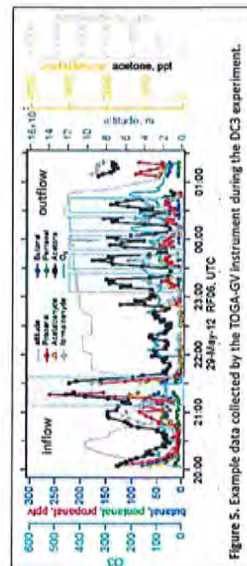


Figure 5. Example data collected by the TOGA-GV instrument during the DC3 experiment.

**Acknowledgements** NSF has provided substantial support for this instrument development project. We also acknowledge support from NASA that provided funds for the development of the first generation airborne GCMS which served as the prototype for the TOGA-GV instrument.

# TOGA – NASA: Trace Organic Gas Analyzer

- GC-MS – Based System - ~35 compounds HCs, CFCs, OVOCs, e.g, methanol, acetone, butane, benzene, CFC-113, acetonitrile, etc.
- Chromatographically separated – mass selected
- All species collected simultaneously
- 2.0 – 2.5 min time resolution
- 0.1 pptv – 20 pptv (methanol) detection limit

## Operation Requirements

- Calibrations, zeros - need minimum of 6 continuous minutes (1 zero, 2 cal) per flight at < 30,000 ft.
- Requirements forwarded to R. Shetter for suitcase flight (LN2, etc.)



## TOGA-ARCTAS full compound list

Compound	Compound
<b>OVOCs</b>	
Methanol	Propanal
Ethanol	Butanal
Acetone	Pentanal
Butanone	2-Pentanone
Methyl tert. Butyl Ether	3-Pentanone
Acetaldehyde	
<b>NMHCs</b>	
Isoprene	Benzene
Propane	Toluene
Butane	Ethyl Benzene
Isobutane	<i>m</i> -Xylene
Pentane	<i>o</i> -Xylene
Isopentane	1,3,5-Trimethylbenzene
1,3-Butadiene	1,2,4-Trimethylbenzene
<b>Halocarbons</b>	
Tetrachloroethylene	CFC-113
Tetrachloromethane	Chloromethane
Chloroform	Methyl Bromide
Methylene Chloride	Methyl Iodide
Chloroacetaldehyde	Chloroacetone
Bromoacetaldehyde	Bromoacetone
<b>Other</b>	
Dimethyl Sulfide	Acetonitrile

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## **EMAIL CORRESPONDENCE**

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**From:** Coleman, Sam  
**To:** [Richard Hyde](#); [Erin Chancellor](#); [Bryan Shaw](#)  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 5:03:10 PM

---

Samuel Coleman, P. E.,  
Deputy Regional Administrator

214.665.2100 Ofc  
214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

Sent from my iPhone

Begin forwarded message:

**From:** "Blanco, Arturo" <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Date:** September 8, 2017 at 10:54:01 AM CDT  
**To:** R6HarveyREOC <[R6HarveyREOC@epa.gov](mailto:R6HarveyREOC@epa.gov)>, "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday

NASA is planning overflight in Houston, possibly also in Port Arthur next week.

Barry is from NASA and his contact information is in his email below.

*Arturo J. Blanco*, OEJTIA Director  
Environmental Justice, Tribal and International Affairs  
US EPA Region 6  
1445 Ross Avenue (6RA-DA)  
Dallas, TX 75202  
214.665.3182 (O)  
214.531.8629 (M)



---

**From:** Lefer, Barry L. (HQ-DK000) [<mailto:barry.lefer@nasa.gov>]  
**Sent:** Friday, September 8, 2017 10:39 AM  
**To:** Blanco, Arturo <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Subject:** NASA DC-8 Payload for Houston Overflight next Thursday

TCEQ-0059

Arturo,

Great talking with you on the phone. Here is a link to the NASA DC-8 Instrument Payload:

<https://espo.nasa.gov/home/atom/instruments>

Early next week (likely Monday afternoon or Tuesday morning), I will share the proposed flight plan for the NASA DC-8 for Thursday September 14th. Unfortunately, we will only have 2-3 hours to sample the atmosphere in Southeastern Texas.

Please feel free to contact me with any questions.

Best regards. Barry

--

Barry Lefer  
Tropospheric Composition Program  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

**From:** Coleman, Sam  
**To:** [Richard Hyde](#); [Erin Chancellor](#); [Bryan Shaw](#)  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 5:03:11 PM

---

Samuel Coleman, P. E.,  
Deputy Regional Administrator

214.665.2100 Ofc  
214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

Sent from my iPhone

Begin forwarded message:

**From:** "Blanco, Arturo" <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Date:** September 8, 2017 at 10:54:01 AM CDT  
**To:** R6HarveyREOC <[R6HarveyREOC@epa.gov](mailto:R6HarveyREOC@epa.gov)>, "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday

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**Sent:** Friday, September 8, 2017 10:39 AM  
**To:** Blanco, Arturo <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Subject:** NASA DC-8 Payload for Houston Overflight next Thursday

TCEQ-0061

Arturo,

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Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

**From:** [Lori Wilson](#)  
**To:** [Ramiro Garcia](#)  
**Cc:** [Tracy Miller](#); [Susan Johnson](#)  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 5:16:53 PM  
**Attachments:** [image003.png](#)

---

Lori Wilson  
Executive Office  
TCEQ  
512-239-1635



---

**From:** Coleman, Sam [mailto:[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)]  
**Sent:** Friday, September 08, 2017 5:03 PM  
**To:** Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Erin Chancellor <[Erin.Chancellor@tceq.texas.gov](mailto:Erin.Chancellor@tceq.texas.gov)>; Bryan Shaw <[Bryan.Shaw@tceq.texas.gov](mailto:Bryan.Shaw@tceq.texas.gov)>  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday

Samuel Coleman, P. E.,  
Deputy Regional Administrator

214.665.2100 Ofc  
214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

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**From:** [Lori Wilson](#)  
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**Cc:** [Tracy Miller](#); [Susan Johnson](#)  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 5:16:53 PM  
**Attachments:** [image003.png](#)

---

Lori Wilson  
Executive Office  
TCEQ  
512-239-1635



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**From:** Coleman, Sam [mailto:[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)]  
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**To:** Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Erin Chancellor  
<[Erin.Chancellor@tceq.texas.gov](mailto:Erin.Chancellor@tceq.texas.gov)>; Bryan Shaw <[Bryan.Shaw@tceq.texas.gov](mailto:Bryan.Shaw@tceq.texas.gov)>  
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Samuel Coleman, P. E.,  
Deputy Regional Administrator

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214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

Sent from my iPhone

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**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>

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Lori Wilson  
Executive Office  
TCEQ  
512-239-1635



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**To:** Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Erin Chancellor <[Erin.Chancellor@tceq.texas.gov](mailto:Erin.Chancellor@tceq.texas.gov)>; Bryan Shaw <[Bryan.Shaw@tceq.texas.gov](mailto:Bryan.Shaw@tceq.texas.gov)>  
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Samuel Coleman, P. E.,  
Deputy Regional Administrator

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214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

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**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>

**Subject: FW: NASA DC-8 Payload for Houston Overflight next Thursday**

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Environmental Justice, Tribal and International Affairs  
US EPA Region 6  
1445 Ross Avenue (6RA-DA)  
Dallas, TX 75202  
214.665.3182 (O)  
214.531.8629 (M)



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NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

**From:** Erin Chancellor  
**To:** [Lori Wilson](#)  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 6:49:55 PM

---

Begin forwarded message:

**From:** "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Date:** September 8, 2017 at 5:03:03 PM CDT  
**To:** Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>, Erin Chancellor <[erin.chancellor@tceq.texas.gov](mailto:erin.chancellor@tceq.texas.gov)>, Bryan Shaw <[Bryan.Shaw@tceq.texas.gov](mailto:Bryan.Shaw@tceq.texas.gov)>  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday

Samuel Coleman, P. E.,  
Deputy Regional Administrator

214.665.2100 Ofc  
214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

Sent from my iPhone

Begin forwarded message:

**From:** "Blanco, Arturo" <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Date:** September 8, 2017 at 10:54:01 AM CDT  
**To:** R6HarveyREOC <[R6HarveyREOC@epa.gov](mailto:R6HarveyREOC@epa.gov)>, "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday

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Barry is from NASA and his contact information is in his email below.

*Arturo J. Blanco, OEJTIA Director*

TCEQ-0069

Environmental Justice, Tribal and International Affairs  
US EPA Region 6  
1445 Ross Avenue (6RA-DA)  
Dallas, TX 75202  
214.665.3182 (O)  
214.531.8629 (M)



---

**From:** Lefer, Barry L. (HQ-DK000) [<mailto:barry.lefer@nasa.gov>]  
**Sent:** Friday, September 8, 2017 10:39 AM  
**To:** Blanco, Arturo <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Subject:** NASA DC-8 Payload for Houston Overflight next Thursday

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Best regards. Barry

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202.358.3857 (o)  
202.769.9064 (c)

**From:** Erin Chancellor  
**To:** [Lori Wilson](#)  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 6:49:56 PM

---

Begin forwarded message:

**From:** "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Date:** September 8, 2017 at 5:03:03 PM CDT  
**To:** Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>, Erin Chancellor <[erin.chancellor@tceq.texas.gov](mailto:erin.chancellor@tceq.texas.gov)>, Bryan Shaw <[Bryan.Shaw@tceq.texas.gov](mailto:Bryan.Shaw@tceq.texas.gov)>  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday

Samuel Coleman, P. E.,  
Deputy Regional Administrator

214.665.2100 Ofc  
214.665. 3110 Desk  
214.665.2016 Cell

[Coleman.sam@epa.gov](mailto:Coleman.sam@epa.gov)

Sent from my iPhone

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**Date:** September 8, 2017 at 10:54:01 AM CDT  
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**Cc:** R6HarveyInfo <[R6HarveyInfo@epa.gov](mailto:R6HarveyInfo@epa.gov)>  
**Subject:** FW: NASA DC-8 Payload for Houston Overflight next Thursday

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Barry is from NASA and his contact information is in his email below.

*Arturo J. Blanco, OEJTIA Director*

TCEQ-0071

Environmental Justice, Tribal and International Affairs  
US EPA Region 6  
1445 Ross Avenue (6RA-DA)  
Dallas, TX 75202  
214.665.3182 (O)  
214.531.8629 (M)



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202.358.3857 (o)  
202.769.9064 (c)

**From:** Erin Chancellor  
**To:** [Stephanie Bergeron Perdue](#); [Emily Lindley](#)  
**Subject:** Fwd: NASA DC-8 Payload for Houston Overflight next Thursday  
**Date:** Friday, September 8, 2017 6:50:16 PM

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Begin forwarded message:

**From:** "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
**Date:** September 8, 2017 at 5:03:03 PM CDT  
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TCEQ-0073

Environmental Justice, Tribal and International Affairs  
US EPA Region 6  
1445 Ross Avenue (6RA-DA)  
Dallas, TX 75202  
214.665.3182 (O)  
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202.769.9064 (c)



**From:** Erin Chancellor  
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**Date:** Friday, September 8, 2017 6:50:16 PM

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**From:** "Coleman, Sam" <[Coleman.Sam@epa.gov](mailto:Coleman.Sam@epa.gov)>  
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*Arturo J. Blanco, OEJTIA Director*

**TCEQ-0075**

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Dallas, TX 75202  
214.665.3182 (O)  
214.531.8629 (M)



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**Sent:** Friday, September 8, 2017 10:39 AM  
**To:** Blanco, Arturo <[Blanco.Arturo@epa.gov](mailto:Blanco.Arturo@epa.gov)>  
**Subject:** NASA DC-8 Payload for Houston Overflight next Thursday

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Tropospheric Composition Program  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

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Samuel Coleman, P. E.,  
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214.665. 3110 Desk  
214.665.2016 Cell

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1445 Ross Avenue (6RA-DA)  
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214.665.3182 (O)  
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TCEQ-0089

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202.769.9064 (c)

**From:** Crossland, Ronnie  
**To:** [Kelly Cook](#)  
**Subject:** FW: M6H1 Harvey Response - 0700 9.9.2017  
**Date:** Saturday, September 9, 2017 8:50:41 AM  
**Attachments:** [9-9-17 0700 Update.pdf](#)

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**From:** R6HarveySITL  
**Sent:** Saturday, September 09, 2017 9:42 AM  
**To:** Hurricane Harvey Principals <Hurricane\_Harvey\_Principals@epa.gov>  
**Cc:** Eoc, Epahq <Eoc.Epahq@epa.gov>  
**Subject:** M6H1 Harvey Response - 0700 9.9.2017

See attached.



Hurricane Harvey 2017  
9/9/2017 – 0700 CDT Update

## EXECUTIVE SUMMARY

- Texas Governor Greg Abbott is traveling to Beaumont today, September 9, 2017. He will be accompanied by EPA Senior Advisor to the Administrator Kell Kelly.
- The Texas Department of Agriculture signed pesticide applicator certification waivers on September 8, 2017 for Department of Defense (DOD) certified applicators that will be conducting aerial applications as soon as the evening of September 9, 2017. The Texas Department of State Health Services has begun aerial mosquito control and requested additional mosquito control assistance from the Federal Emergency Management Agency. Aerial insecticide spraying began over Refugio and Bee counties September 7, 2017 from dusk to dawn when mosquitoes are most active.
- The Texas Department of State Health Services (TX DSHS) requested that FEMA coordinate with the U.S. Department of Agriculture for a rapid response for messaging to Certified Organic Farmers that may be affected by aerial spray operations. TX DSHS is concerned that this unresolved issue will result in some counties electing not to have aerial spray operations conducted.
- Office of Emergency Management Director Reggie Cheatham and Jodi Beringer, OMB Budget Manager will visit the Dallas Emergency Operations Center and ASPECT aircraft during scheduled maintenance in Addison. They will travel to Houston on Monday, September 11, 2017 to tour EPA's command post, Houston laboratory, and the San Jacinto Superfund site.
- NASA SMD/Earth Science is preparing to send the DC-8 to spend several hours in southern Texas sampling atmospheric trace gases and aerosols – these include a full suite of Volatile Organic Compounds (VOCs) and several air toxics. This effort is part of preparations for an upcoming campaign of the Atmospheric Tomography Mission (ATom), which is an Earth Venture-Suborbital mission. The ATom science team had a planned DC-8 test flight on September 14, 2017 from Palmdale to Houston to sample the atmospheric composition during this test flight. EPA has requested that NASA better define the proposed plan, integrate sampling with EPA and TCEQ on-going activities and work with EPA Office of Research and Development regarding on the reliability of the data from their technology.



- EPA has recommended the State request that local jurisdictions approved for burning notify the public when burning is conducted. Today, EPA by letter concurred State of Texas use of its emergency hurricane debris management guidance. TCEQ has the authority to waive certain requirements to allow open burning of woody debris from Hurricane Harvey aftermath. The State can approve open burning of debris, consistent with guidance provided by the TCEQ.
- EPA continues to coordinate with the Texas Department of State Health Services regarding the need for residential well testing. Based on conversations at the JFO, a state request for a mission assignment for this work appears unlikely.
- Governor Abbott sent a letter to Administrator Pruitt encouraging support for the Texas Water Development Board's request flexibility in allowances and procedural changes to the State Revolving Loan Fund program so funds can be used to address immediate recovery and future resiliency efforts is acceptable. EPA believes most of the request is approvable and will respond with a letter following Monday's scheduled meeting.
- DFW-based Fruit of the Earth produces a product that has a combined EPA registration in both sunscreen and insect repellent, that is currently under a stop sale order by EPA. Because of the combined registration the EPA will not allow sale or donation of the product at this time. The company has stated that it would like to donate approximately 200,000 units for Hurricane Harvey relief efforts but is unable to do so because of the EPA. EPA is evaluating the status of the company's FIFRA application and also whether some type of emergency exemption may be warranted.
- EPA has received 17 notifications of force majeure claims from companies covering Louisiana/Texas gulf facilities that impending storms may cause a delay or impediment to performance in complying with provisions of their Consent Decrees.
- Local interest (San Jacinto River Waste Pits Community Awareness Committee and Galveston Bay Foundation) regarding the status and repairs at the San Jacinto River Waste Pits Superfund site continues to be high. EPA will conduct confirmation sampling at the site on Monday.
- Mayor's Office of Public Safety and Homeland Security announced that the Houston EOC will close by the end of the day on Sunday. Normal operations will continue within regular City departments. EPA's liaison at the EOC will depart.
- TCEQ has invited EPA and Harris County Pollution Control Agency to participate in a Hurricane Harvey Update for environmental advocacy organizations including Environmental Integrity Project, Sierra Club, Public Citizen, Environmental Defense Fund, and Air Alliance Houston early next week in Austin, Texas. The meeting is scheduled for Tuesday.
- U.S. Department of Justice has agreed to flexibility in resuming and completing the negotiations with both City of Corpus Christi and Houston related to their Clean Water Act sanitary sewer violations.

- Community Liaison deployments continue to assist impacted counties by providing information about environmental and health challenges associated with returning to flood damaged homes.
- EPA expects to receive an amended mission assignment today providing about \$1.5 million additional funding to continue response operations. FEMA has announced plans to fund mission assignments in five day increments.

## **PUBLIC AFFAIRS**

The EPA Liaison to the City of Houston Mayor's Office provided an update on EPA operations to Mayor Turner at the Emergency Operations Center's Senior Leadership meeting Friday, September 8, 2017. This was the final Senior Leadership meeting, as several city departments will be returning to normal hours and operations. The remaining agencies and departments are expected to conclude operations at the Emergency Operations Center on Sunday September 10, 2017. The EPA Liaison will demobilize on Monday, September 11, 2017.

Community Liaisons (CLs) continue to be deployed to impacted areas. Tasks will include touching base with various response organizations in the 39 declared counties and providing information for use in the recovery process. By September 10, 2017, a total of 39 CLs will be in the community.

## **DEBRIS RECOVERY**

EPA currently has no mission assignment for debris recovery operations.

## **AIR MONITORING**

EPA deployed four air quality technical specialists to Houston on September 8, 2017. The specialists will conduct surveillance in the Manchester area to evaluate potential sources of volatile organic compounds and benzene that have been detected in the area recently. They will perform air monitoring, evaluate data and conduct facility assessments, as appropriate. This activity is being conducted in partnership with TCEQ.

EPA's TAGA mobile laboratory is currently non-operational due to a technical malfunction. Replacement parts and a technician are enroute and repairs are expected to occur today. A second EPA TAGA is enroute from Las Vegas, Nevada.

## EMERGENCY RESPONSE

Daily/Cumulative Summary of Hazard Evaluations/Recovery				
Status	Opened		Closed	
	9/8/2017	Number of Targets Remaining Open	9/8/2017	Cumulative
Corpus Christi Branch	1	28	9	86
Houston Branch	41	234	0	27
Port Arthur/Beaumont Branch	13	48	1	7
NRC Reports	0	3	0	0
<b>TOTALS</b>	<b>55</b>	<b>313</b>	<b>10</b>	<b>120</b>
Note: Open means the target is yet to be recovered. Closed means the target was recovered/left in place or access was denied to collect the item.				

Daily/Cumulative Summary of Spills/Discharges				
Status	Opened		Closed	
	9/8/2017	Cumulative	9/8/2017	Cumulative
Corpus Christi Branch	15	449	24	140
Houston Branch	4	97	3	36
Port Arthur/Beaumont Branch	3	23	0	9
NRC Reports	3	99	4	36
<b>TOTALS</b>	<b>25</b>	<b>668</b>	<b>31</b>	<b>221</b>

## FIELD RESPONSE ACTIVITIES

FIELD TEAMS ON 9/8/2017				
<u>Teams</u>	Alpha	Bravo	Charlie	TOTAL
<b>Hazard Evaluation</b>	3	24	8	35
<b>Oil Discharge Assessment</b>	1	6	0	7
<b>ER/Orphan Container Recovery</b>	2	1	1	4
<b>Oil/Vessel Recovery</b>	5	0	0	5
<b>Staging Areas</b>	1	1	0	2
<b>Air Operations</b>	0	1	0	1
<b>Air Monitoring</b>	0	3	0	3
<b>Water Infrastructure Assessment – Drinking Water</b>	0	10	1	11
<b>Water Infrastructure Assessment – Wastewater</b>	0	5	0	5
<b>TOTAL</b>	<b>12</b>	<b>51</b>	<b>10</b>	<b>73</b>

### CORPUS CHRISTI BRANCH:

Oversight of fuel transfer of Signet Enterprise continued, with a total of 79,000 gallons being transferred to date. The Oil Discharge Assessment Team will be on the scene tomorrow to oversee the removal process of all waste oil and to complete a final assessment.

Five Oil Discharge Recovery Teams coordinated and monitored responsible-party-led operations

in Island Moorings, Rattle Snake Point, Ingleside, Seadrift, Harbor of Refuge, and Holiday Beach. In preparation of the signing of the Unified Command Approved Vessel Removal Protocols, the teams within the Oil Discharge Recovery Group prioritized sites for removal.

Three Hazard Evaluation (HE) Teams conducted assessments in the Rockport area. HE Teams traveled by boat to the Voestalpine facility in San Patricio County and assessed the drainage area behind the Voestalpine unloading dock. Soil/sediment samples were collected at three locations at the site and one location in the Corpus Christi Bay near a storm drain that discharges into the bay. An HE Team assessed the Copano Bay area for orphan containers.

An inventory of all 113 recovered items was completed on the staging pad in preparation for field screening.

	CONTAINERS			Cylinders	TOTAL
	Drums [55 gals]	Small Containers [<55 gals]	Large Containers [>55 gals]		
9/8/2017	4	0	1	5	10
<b>TOTAL TO DATE</b>	57	31	8	17	113

#### HOUSTON BRANCH:

Four EPA Region 6 air quality technical specialists deployed to Houston on September 8, 2017. Two air quality technical specialists teamed up with TCEQ investigators and made entry to the Valero Houston Refinery. They viewed Tank 3 with the failed roof and Tank 228 with the pinhole leak in the drain line. Valero estimates that Tank 228 will be emptied and degassed by next week. Tank 3 is the more problematic of the tanks as liquid has collected on the crumpled roof. The tank is still unsafe to empty and inspect. There is no estimate yet as to when that tank will be emptied and inspected. EPA and TCEQ recommended that Valero conduct perimeter monitoring in the interim.

The Air Recon Team conducted an aerial overflight of Bastrop, Lee and Fayette Counties, and the Brazos River in Fort Bend County with nothing significant to report. They did identify three sunken sailing vessels with no evidence of a discharge near Galveston Island. The Air Recon Team also assessed a reported sheen. It did not appear to be an ongoing discharge; however, the site will not be closed until further assessment can be conducted. The area is currently inaccessible except by boat or aircraft.

Twenty-four HE Teams conducted and completed assessments in Brazoria, Matagorda, Harris, and Galveston Counties. There were no emergent or substantial risks posed by identified sites.

HE Assessment Status: 100% complete in Liberty, Austin, Waller, Chambers, Montgomery, Fort Bend, Galveston, Bastrop, Lee, Fayette, Colorado and Walker Counties; 90% complete in Brazoria County; 80% complete in Wharton County; 60% complete in Harris County; and 30% complete in Matagorda County.

During the day's assessment it was observed that the Matagorda and Brazos Rivers had finally crested.

EPA's ASPECT aircraft conducted assessments over the Beaumont area and the State's special site list.

#### PORT ARTHUR/BEAUMONT BRANCH:

Eight HE Teams conducted assessments in Pleasure Island, China, Nome, Beaumont, the Neches River, Sour Lake, the Sabine River and Taylor Bayou. No emergent or substantial risks were posed from identified sites.

The Discharge Assessment Team reported 125 gallons of diesel fuel was discharged at the maintenance facility outside of the Beaumont Federal Prison. The source was secured and the spill removed by an Oil Spill Removal Organization.

A Hazard Evaluation Team reported a natural gas leak in Vidor, Texas. The responsible party was identified as PRO Gas. EPA oversaw the securing of the leak by a PRO Gas technician.

#### DRINKING WATER / WASTEWATER ASSESSMENTS

EPA is providing support to TCEQ for drinking water and wastewater system assessments. Ten EPA personnel are conducting drinking water assessments in the Houston Branch, five personnel are conducting wastewater assessments in the Houston Branch and one person is conducting drinking water assessments in the Port Arthur/Beaumont Branch.

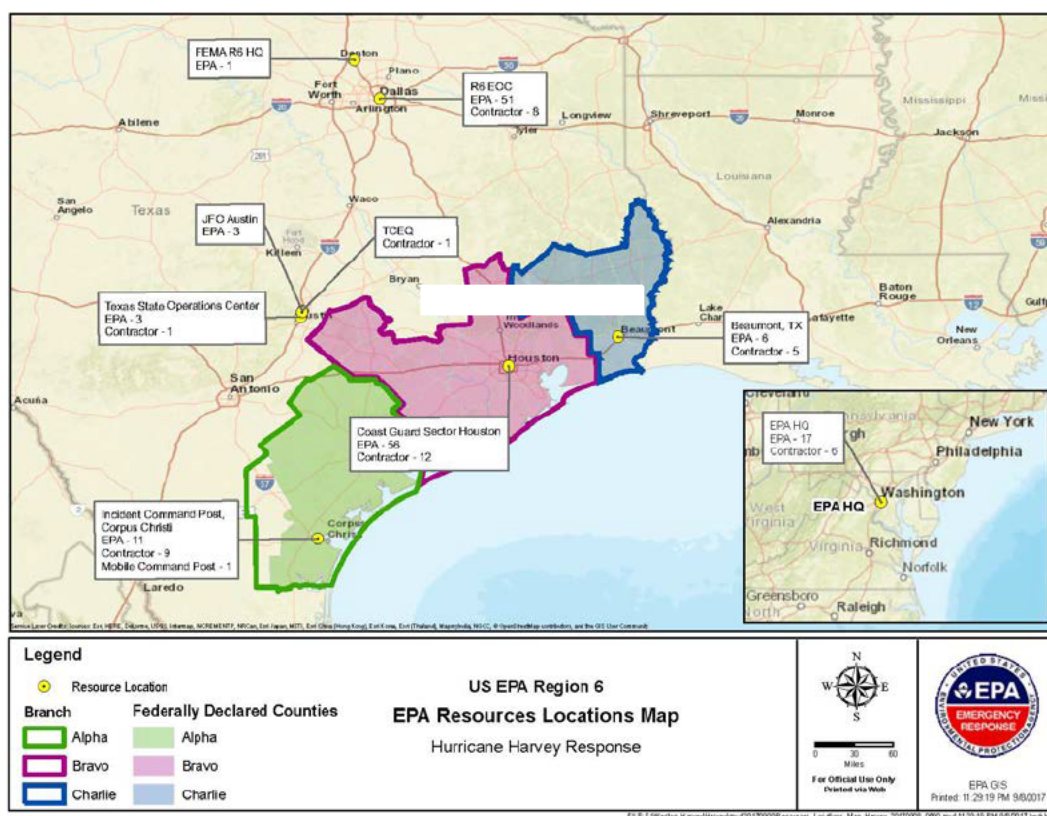
<b>Drinking Water and Wastewater Assessments (September 8, 2017)</b>		
<b>Assessment Types</b>	<b>Daily Assessments</b>	<b>Total Assessments</b>
On-Site DW Assessments	53	295
On-Site WW Assessments	26	193
Phone DW Assessments	331	4969
Phone WW Assessments	82	3017





## EPA RESOURCES

Personnel	EPA Dallas, TX	FEMA Denton, TX	Texas JFO Austin, TX	Texas SOC Austin, TX	TCEQ Austin, TX	Houston, TX	Corpus Christi, TX	Beaumont, TX	HQ EOC, Wash, DC	TOTAL
EPA	51	1	3	3	0	56	12	6	17	149
START	8			1	1	12	9	5		36
ERRS						16	8	3		27
Other Contractors	1								6	7
TOTAL	60	1	3	4	1	84	29	14	23	219



## FUNDING

**September 8, 2017, UPDATED 1300 hours**

Funding Sources	Funding Ceiling	Funding Ceiling Less Indirect	Spent to Date	Remaining Balance	Daily Burn Rate	Days Remaining
Non Mission Assignment	N/A		\$64,200.00	\$0.00		
MA 4332DR-TX-EPA-01	\$275,000.00	\$242,741.00	\$24,816.00	\$217,925.00	\$2,848.00	76.52
MA 4332DR-TX-EPA-03	\$8,592,000.00	\$7,584,077.00	\$5,248,884.21	\$2,335,192.79	\$282,745.51	8.26
Totals:	\$8,867,000.00	\$7,826,818.00	\$5,337,900.21	\$2,553,117.79		

Indirect costs represent the money the Cincinnati Shared Service Center takes off the top to manage the Mission Assignments

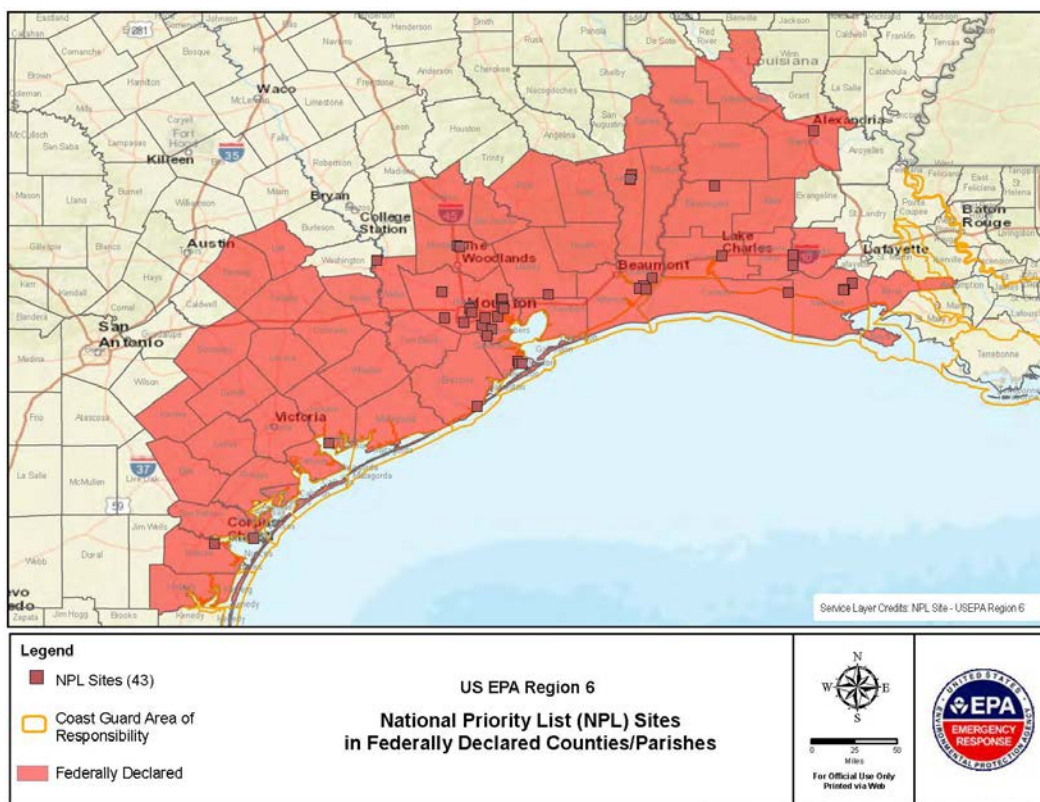


## **REFINERIES/FUEL WAIVERS**

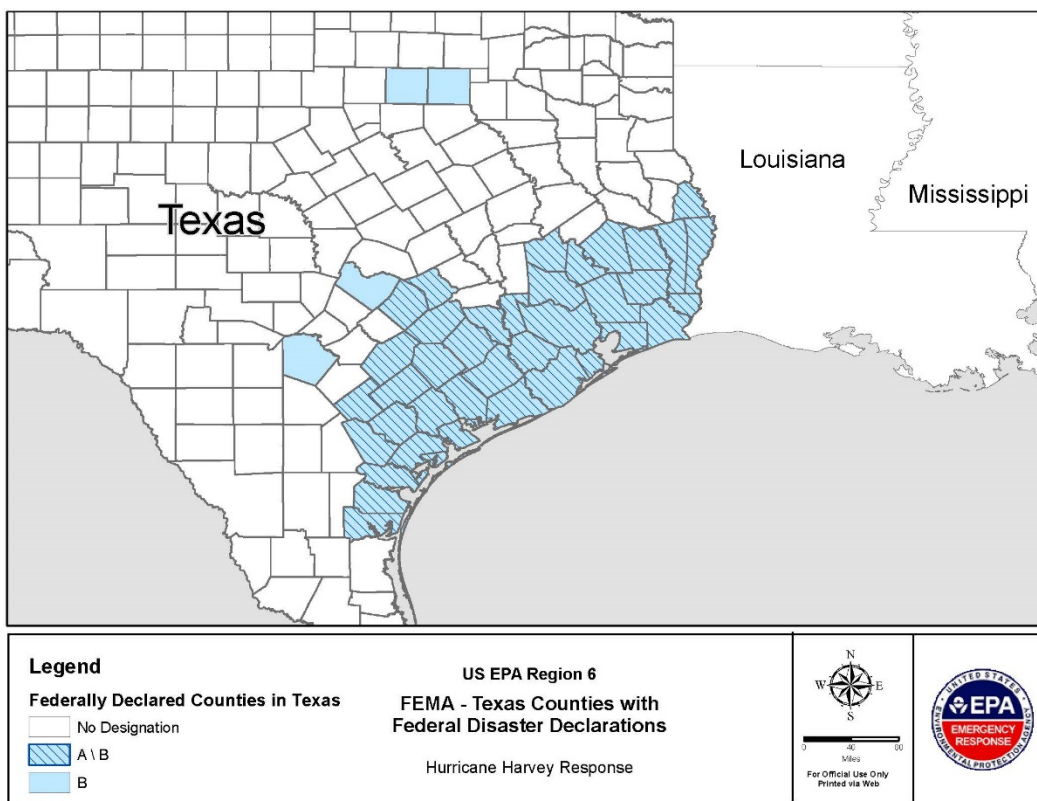
- EPA has extended the current multi-state fuel waiver to September 26, 2017.
- EPA has granted all open fuel waivers requested to date.
- EPA has issued a No Action Assurance for the Use of Vapor Recovery Systems in Texas Related to Hurricane Harvey (September 1, 2017). EPA will exercise its discretion not to pursue enforcement for violations of the vapor recovery requirements for fuel loading and unloading under 40 CFR Part 60 Subpart XX and Part 63 Subparts, R, Y, CC, BBBB, and 30 Texas Administrative Code sections 115.212, .214.
- The Internal Revenue Service expanded the red dye fuel waiver to cover the entire state of Texas, not just the 110 counties as before.

## **FEDERAL SUPERFUND NPL SITES**

- All 43 Federal Superfund NPL Sites in the affected area have been assessed. Of these, 41 sites have been cleared, and two sites (San Jacinto Pits and US Oil Recovery) require additional follow-up.
  - U.S. Oil Recovery Update: On September 7, 2017, a total of 16 vacuum truckloads of water (approximately 80,000 gallons) were removed and shipped off-site for disposal. The potentially responsible party continues operating pumping equipment and a storage tank to maintain and control overflow. Sampling of the lift station water continues. In addition, soil and ground water samples were collected on September 8, 2017. No sheen or odor was observed in the overflowing water.
  - San Jacinto Waste Pits Update: Cap repairs and underwater cap surveying continues at the San Jacinto Superfund Site. The EPA dive team is on-site and integrated in the cap survey efforts. Sampling of sediment and surface water was completed on September 7, 2017.
- On September 5, 2017, EPA initiated sampling at NPL sites in Texas. EPA will sample all 34 Texas NPL sites to confirm no releases. Sampling will be completed by September 11, 2017. Results will be delivered to the Region by September 14, 2017.



## FEMA – TEXAS COUNTIES WITH DISASTER DECLARATIONS



## 9/8/2017 FIELD ACTIVITIES

### PHOTOS



Port Arthur/Beaumont Branch –  
EPA On-Scene Coordinator (OSC) discusses operations with members of the U.S. Coast Guard



Bravo Branch – EPA preparing waste pad

# DRAFT E-MAIL

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**Sent:** Saturday, September 9, 2017 10:42 AM  
**To:** Ramiro Garcia; Richard Chism; Kelly Cook; Ashley K. Wadick; Lori Wilson; Emily Lindley; Ryan Vise (Ryan.Vise@Tceq.Texas.Gov)  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
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Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

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**From:** Gray, David [mailto:gray.david@epa.gov]  
**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <thomas.h.zurbuchen@nasa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Richard Hyde <richard.hyde@tceq.texas.gov>; Michael Honeycutt <Michael.Honeycutt@tceq.texas.gov>; Rauscher, Jon <Rauscher.Jon@epa.gov>; Crossland, Ronnie <Crossland.Ronnie@epa.gov>  
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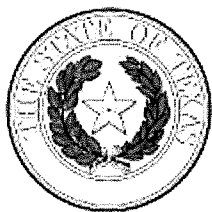
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David Gray

## Kelly Cook

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**From:** Michael Honeycutt  
**Sent:** Saturday, September 9, 2017 10:43 AM  
**To:** Ramiro Garcia; Richard Chism; Kelly Cook; Ashley K. Wadick; Lori Wilson; Emily Lindley; Ryan Vise; Susan Johnson; Tracy Miller; Sabine Lange  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight



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**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 10:43:23 AM  
**Attachments:** [image001.png](#)

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**From:** Emily Lindley  
**To:** [Stephanie Bergeron Perdue](#)  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 10:55:30 AM  
**Attachments:** [image001.png](#)

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FYI

Sent from my iPhone

Begin forwarded message:

**From:** Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
**Date:** September 9, 2017 at 10:43:22 AM CDT  
**To:** Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Gray, David [<mailto:gray.david@epa.gov>]  
**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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David Gray

**From:** Lori.Wilson@tceq.texas.gov  
**To:** [Erin Chancellor](#); [Richard Hyde](#)  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 10:59:08 AM  
**Attachments:** [image001.png](#)

---

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**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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**To:** [Erin Chancellor](#); [Richard Hyde](#)  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight  
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**Attachments:** [image001.png](#)

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**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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David Gray

# DRAFT E-MAIL

---

**From:** Stephanie.Bergeron\_Perdue@tceq.texas.gov  
**Sent:** Saturday, September 9, 2017 11:01 AM  
**To:** Emily Lindley  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight

Thx

Sent from my iPhone

On Sep 9, 2017, at 10:55 AM, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)> wrote:

FYI

Sent from my iPhone

Begin forwarded message:

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**Date:** September 9, 2017 at 10:43:22 AM CDT  
**To:** Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>  
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<image001.png> Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

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**From:** Gray, David [<mailto:gray.david@epa.gov>]  
**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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David Gray

**From:** [Stephanie Bergeron Perdue](#)  
**To:** [Emily Lindley](#)  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:01:10 AM  
**Attachments:** [image001.png](#)

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Thx

Sent from my iPhone

On Sep 9, 2017, at 10:55 AM, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)> wrote:

FYI

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**From:** Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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**To:** Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>  
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<image001.png> Michael Honeycutt, Ph.D.  
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Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Gray, David [[mailto:gray.david@epa.gov](mailto:mailto:gray.david@epa.gov)]

TCEQ-0130

**Sent:** Saturday, September 09, 2017 10:38 AM

**To:** Zurbuchen, Thomas H. (HQ-DA000)

<[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>;

Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt

<[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon

<[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie

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**From:** Ashley K. Wadick  
**To:** [Andy Goodridge](#)  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:22:35 AM  
**Attachments:** [image001.png](#)

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**From:** Stephanie.Bergeron\_Perdue@tceq.texas.gov  
**Sent:** Saturday, September 9, 2017 11:24 AM  
**To:** Erin Chancellor  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight

Sent from my iPhone

Begin forwarded message:

**From:** Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>  
**Date:** September 9, 2017 at 10:55:29 AM CDT  
**To:** Stephanie Bergeron Perdue <[Stephanie.Bergeron\\_Perdue@tceq.texas.gov](mailto:Stephanie.Bergeron_Perdue@tceq.texas.gov)>  
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**To:** Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Gray, David [<mailto:gray.david@epa.gov>]  
**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael

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<[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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David Gray

**From:** [Stephanie Bergeron Perdue](#)  
**To:** [Erin Chancellor](#)  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:24:11 AM  
**Attachments:** [image001.png](#)

---

Sent from my iPhone

Begin forwarded message:

**From:** Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>  
**Date:** September 9, 2017 at 10:55:29 AM CDT  
**To:** Stephanie Bergeron Perdue <[Stephanie.Bergeron\\_Perdue@tceq.texas.gov](mailto:Stephanie.Bergeron_Perdue@tceq.texas.gov)>  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight

FYI

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TCEQ-0139



Mobile: (512)623-0916

E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

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**From:** Gray, David [<mailto:gray.david@epa.gov>]

**Sent:** Saturday, September 09, 2017 10:38 AM

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<[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>;

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**Attachments:** [image001.png](#)

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TCEQ-0142



Mobile: (512)623-0916

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David Gray

**From:** [Andy Goodridge](#)  
**To:** [Ashley K. Wadick](#)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:35:54 AM  
**Attachments:** [image001.png](#)

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Received, thanks. There is an email thread attachment referenced below that didn't seem to come through. Not sure if it's needed in light of Mr. Gray's synopsis.

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**From:** Ashley K. Wadick  
**Sent:** Saturday, September 09, 2017 11:23 AM  
**To:** Andy Goodridge <[Andy.Goodridge@tceq.texas.gov](mailto:Andy.Goodridge@tceq.texas.gov)>  
**Subject:** Fwd: Coordination Follow-up: NASA Houston DC-8 flight

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**Sent:** Saturday, September 09, 2017 10:38 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael

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**From:** Ashley K. Wadick  
**To:** [Andy Goodridge](#)  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:56:27 AM  
**Attachments:** [image001.png](#)

---

No attachment on the one I received, either.

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<[image001.png](#)> Michael Honeycutt, Ph.D.  
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**To:** [Michael Honeycutt](#)  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 11:56:44 AM  
**Attachments:** [image001.png](#)

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Based on the email thread attached, I am connecting us with TCEQ Executive Director Richard Hyde and Dr. Michael Honeycutt regarding your proposed mission to send the NASA DC-8 to spend several hours in southern Texas sampling atmospheric trace gases and aerosols - these include a full suite of Volatile Organic Compounds (VOCs) and several air toxics. I have also

included our Toxicologist Jon Rausher.

We have a lot of monitoring and data being released by external sources including non-government organizations and the media which is leading to conflicting information.

The state has an air monitoring network in the area so we will need to ensure your efforts won't conflict with the ongoing work in the area. We also have our TAGA bus conducting air monitoring at ground level. EPA is also flying our own air monitoring surveillance aircraft ASPECT in the area so it may make more sense to direct your asset (as Sam suggested) to other facilities that we have not been able to reach yet.

Without fully understanding NASA capabilities – it is difficult to be certain to understand how best to deploy your asset. I am hesitant to have it collect additional information that overlaps our existing efforts until we know more.

We certainly appreciate your offer. Let's see what makes sense to this group. I am happy to setup a conference call if our teams can benefit from further discussion.

David Gray

**From:** [Kelly Cook](#)  
**To:** [Michelle Havelka](#)  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Saturday, September 9, 2017 12:03:00 PM  
**Attachments:** [image001.png](#)

---

**From:** Michael Honeycutt

**Sent:** Saturday, September 09, 2017 10:43 AM

**To:** Ramiro Garcia <ramiro.garcia@tceq.texas.gov>; Richard Chism <Richard.Chism@tceq.texas.gov>; Kelly Cook <kelly.cook@tceq.texas.gov>; Ashley K. Wadick <Ashley.K.Wadick@tceq.texas.gov>; Lori Wilson <Lori.Wilson@tceq.texas.gov>; Emily Lindley <Emily.Lindley@tceq.texas.gov>; Ryan Vise <Ryan.Vise@Tceq.Texas.Gov>; Susan Johnson <susan.johnson@tceq.texas.gov>; Tracy Miller <tracy.miller@tceq.texas.gov>; Sabine Lange <Sabine.Lange@tceq.texas.gov>

**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Gray, David [<mailto:gray.david@epa.gov>]

**Sent:** Saturday, September 09, 2017 10:38 AM

**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>

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David Gray

**From:** Lefer, Barry L. (HQ-DK000)  
**To:** [David Gray](#); [Michael Honeycutt](#)  
**Subject:** More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:49:43 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)

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I will be available Sunday night, all-day Monday and all-day Tuesday. Please contact me via email or phone and I would be happy to work with you to answer your questions and try to address any concerns.

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Barry Lefer  
Program Manager, Tropospheric Composition Program  
ATom Program Scientist  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)

202.769.9064 (c)

***The NASA DC-8 is planning to carry out on 14 Sep 2017 a survey flight of atmospheric photochemical reactivity, focused on the regional scale, over the Gulf coast area of Texas affected by flooding from Hurricane Harvey.***

The massive floods in Houston have caused environmental damage with many dimensions. VOCs have been mobilized, vegetation and structures have been destroyed, mold, disturbed soil, and muck are widely distributed, heavy industry and transportation have been disrupted. A great deal of construction equipment activity is currently taking place as part of the clean-up, which might lead to elevated concentrations of NO<sub>x</sub>.

The DC-8 is currently loaded with a full payload of chemistry instrumentation in preparation for the imminent departure on a global mission, the Atmospheric Tomography Mission (ATom, 3<sup>rd</sup> deployment). The coincidence of ATom with the aftermath of flooding in Houston and Beaumont provides the opportunity to assess lingering pollution effects at regional scale. The date for the flight has been set to Thursday 14 Sep 2017, in the afternoon.

Our goal for this flight is to examine whether there have been *major shifts compared to the typical atmospheric environment in Houston and vicinity in the aftermath of the storm*. Our DC-8 payload has excellent real time NO<sub>x</sub>, O<sub>3</sub>, formaldehyde, HO<sub>x</sub>, CO, and reactive intermediates, plus total nitrate and sulfate, and tracers. We also have a superb real-time aerosol suite including a number of aspects composition (e.g. PALMS, AMS). We will compare the observations from this flight to the large data sets already existing for Houston, from previous studies.

A much larger number of species, especially VOCs, can be measured on our payload, in time-averaged sampling. We can take up to 168 WAS flask samples, a comparable number of TOGA samples (30 s averages, every 2.5 minutes), and 42 PFPs (for halocarbons etc). Note that we do not have a PTRMS or other sensor to measure VOCs rapidly. This payload, and a plane as big and fast as the DC-8, is not suitable to measure point sources of VOCs or related materials. Thus facility scale emissions are not the focus of our planned measurements.

The planned measurements will not duplicate any of the data being collected by the State of Texas or by the US EPA. The DC-8 is focused on the regional scale – the Big Picture.

The following pages provide a schematic of the planned flight track.

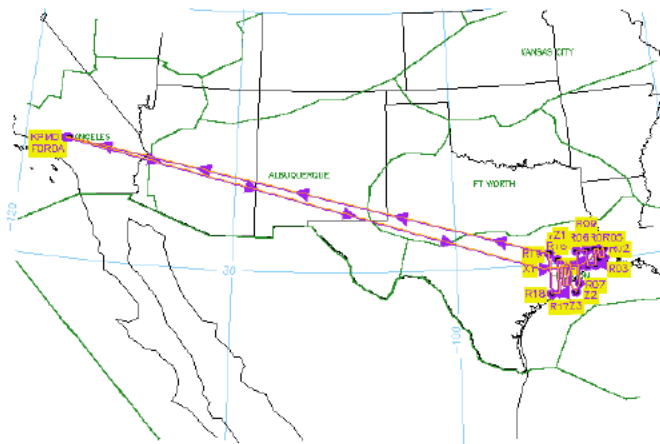
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

- It is important to begin the pattern no earlier than local noon. Arrival time on-station is planned for around 18:00 UTC (1:00 PM CDT).
- Speed/pitch/yaw maneuvers are desired. No MMS box will be done, in the interest of maximizing time on station.
- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

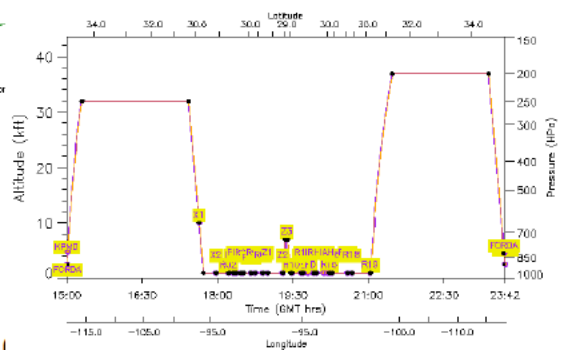
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



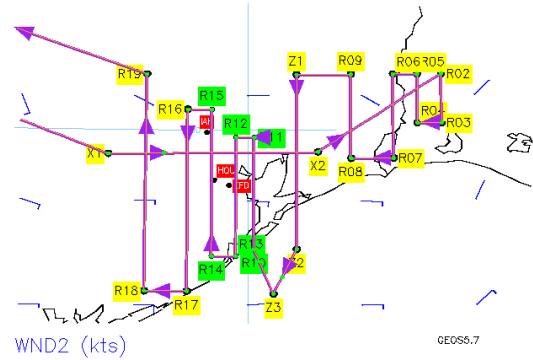
TCEQ-0162

# Flight TF1: Palmdale-Houston-Palmdale, continued

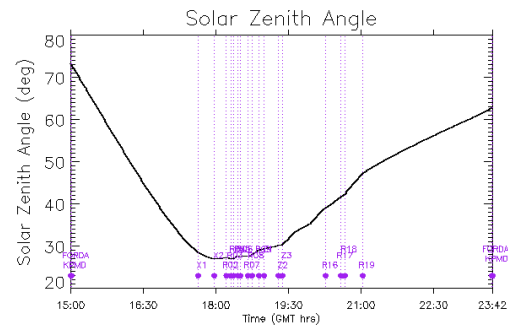
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

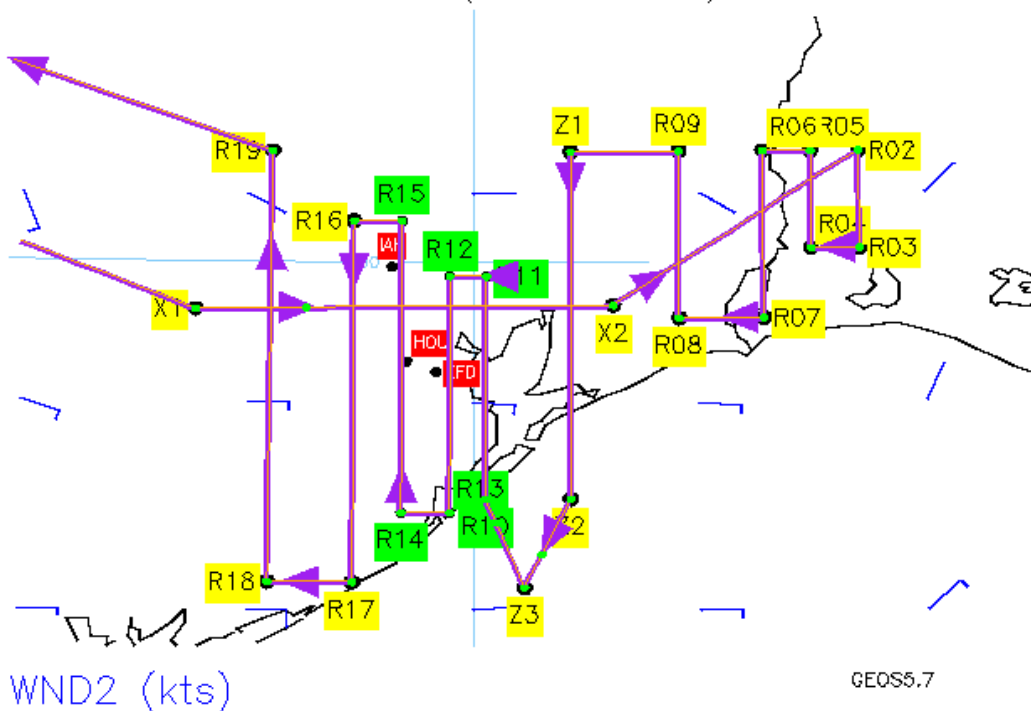


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
R04 N 30° 03.000', W 093° 36.000'  
R05 N 30° 24.000', W 093° 36.000'  
R06 N 30° 24.000', W 093° 47.999'  
R07 N 29° 48.000', W 093° 47.999'  
R08 N 29° 48.000', W 094° 09.000'  
R09 N 30° 24.000', W 094° 09.000'  
Z1 N 30° 24.000', W 094° 36.000'  
Z2 N 29° 09.000', W 094° 36.000'  
Z3 N 28° 49.902', W 094° 47.417'

R10: N 29° 09', W 094° 57.0'  
R11: N 29° 57', W 094° 57.0'  
R12: N 29° 57', W 095° 06.0'  
R13: N 29° 06', W 095° 06.0'  
R14: N 29° 06', W 095° 18.0'  
R15: N 30° 09', W 095° 18.0'  
R16: N 30° 09', W 095° 30.0'  
R17: N 28° 51', W 095° 30.0'  
R18: N 28° 51', W 095° 51.0'  
R19: N 30° 24', W 095° 50.4'

Note: way points are only approximate.

# DRAFT E-MAIL

---

**From:** Michael.Honeycutt@tceq.texas.gov  
**Sent:** Sunday, September 10, 2017 10:54 AM  
**To:** Lefer, Barry L. (HQ-DK000)  
**Cc:** David Gray  
**Subject:** Re: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

Thanks, Barry. I will forward your email to the appropriate TCEQ staff.

Mike

On Sep 10, 2017, at 10:49 AM, Lefer, Barry L. (HQ-DK000) <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)> wrote:

David and Michael,

I wanted to reach out to you to provide you with as much information that you need regarding the proposed NASA DC-8 flight over southeastern Texas scheduled for Thursday, September 14<sup>th</sup>.

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202.358.3857 (o)  
202.769.9064 (c)

<Houston\_revb\_draft\_20170909.pdf>

**From:** [Michael Honeycutt](#)  
**To:** [Lefer, Barry L. \(HQ-DK000\)](#)  
**Cc:** [David Gray](#)  
**Subject:** Re: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:54:31 AM

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<Houston\_revb\_draft\_20170909.pdf>

**From:** [Michael Honeycutt](#)  
**To:** [Lori Wilson](#); [Emily Lindley](#); [Ashley K. Wadick](#); [Ramiro Garcia](#); [Kelly Cook](#); [Ryan Vise](#); [Tracy Miller](#); [Susan Johnson](#); [Sabine Lange](#); [Lindsey Jones](#); [Richard Chism](#); [Andy Goodridge](#); [Jonathan Walling](#)  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:56:59 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[ATT00001.htm](#)

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Begin forwarded message:

**From:** "Lefer, Barry L. (HQ-DK000)" <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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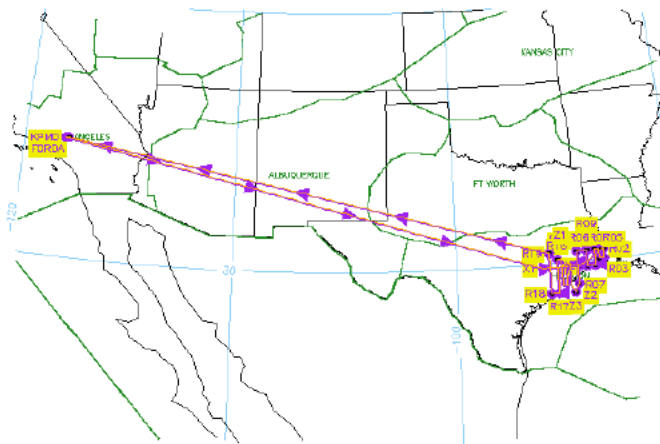
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

- It is important to begin the pattern no earlier than local noon. Arrival time on-station is planned for around 18:00 UTC (1:00 PM CDT).
- Speed/pitch/yaw maneuvers are desired. No MMS box will be done, in the interest of maximizing time on station.
- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

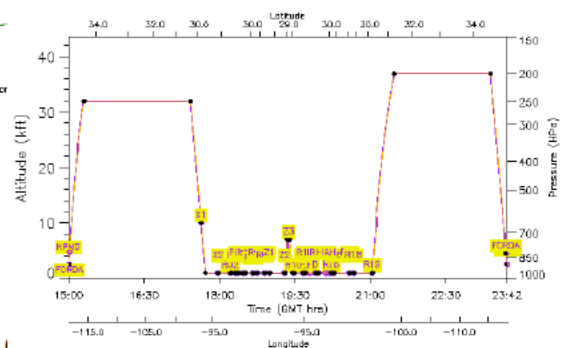
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



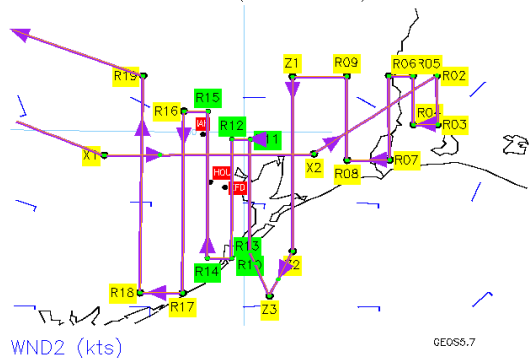
TCEQ-0172

# Flight TF1: Palmdale-Houston-Palmdale, continued

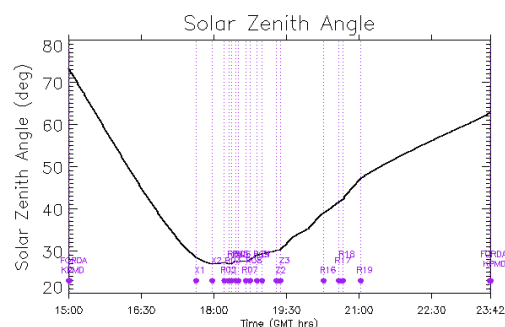
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
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- Update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

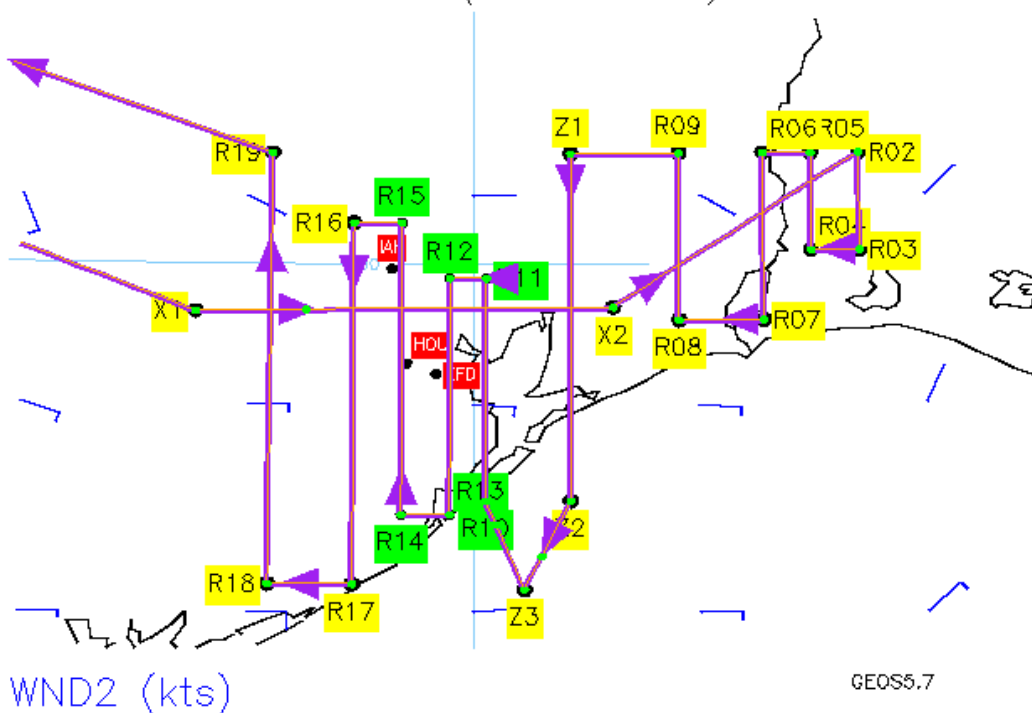


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

TCEQ-0173



Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
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R07 N 29° 48.000', W 093° 47.999'  
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**From:** [Michael Honeycutt](#)  
**To:** [Lori Wilson](#); [Emily Lindley](#); [Ashley K. Wadick](#); [Ramiro Garcia](#); [Kelly Cook](#); [Ryan Vise](#); [Tracy Miller](#); [Susan Johnson](#); [Sabine Lange](#); [Lindsey Jones](#); [Richard Chism](#); [Andy Goodridge](#); [Jonathan Walling](#)  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:56:59 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[ATT00001.htm](#)

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**From:** "Lefer, Barry L. (HQ-DK000)" <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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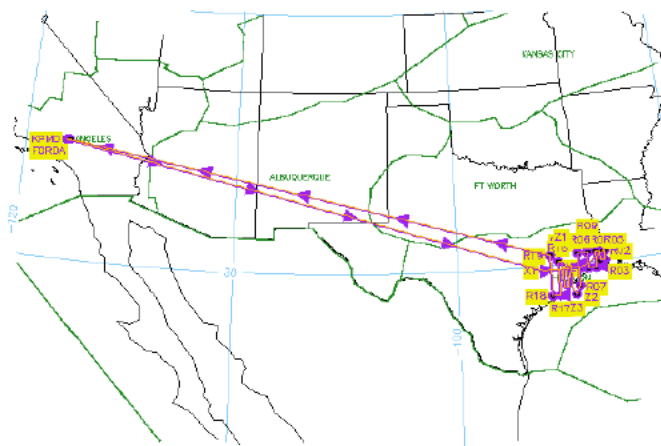
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

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- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

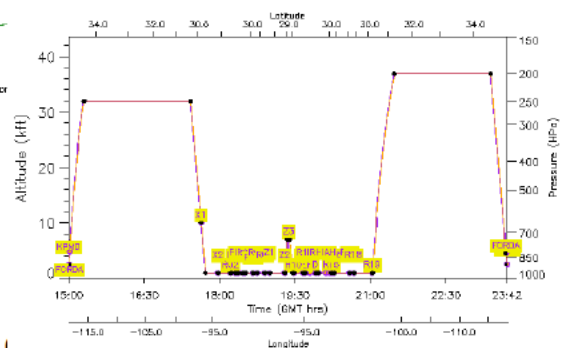
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



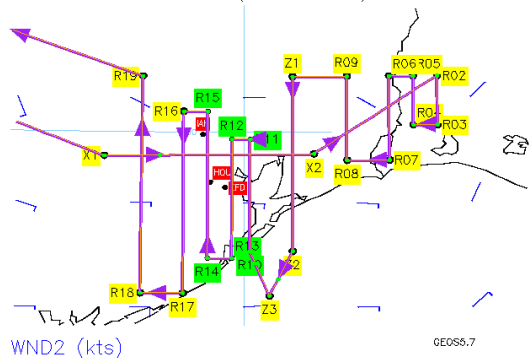
TCEQ-0178

# Flight TF1: Palmdale-Houston-Palmdale, continued

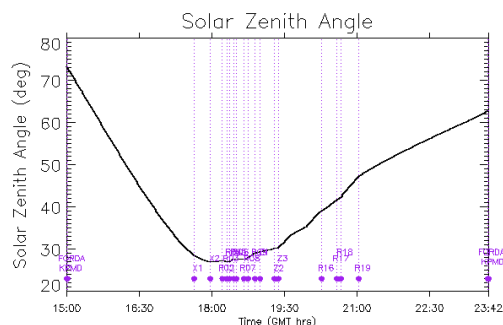
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
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2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

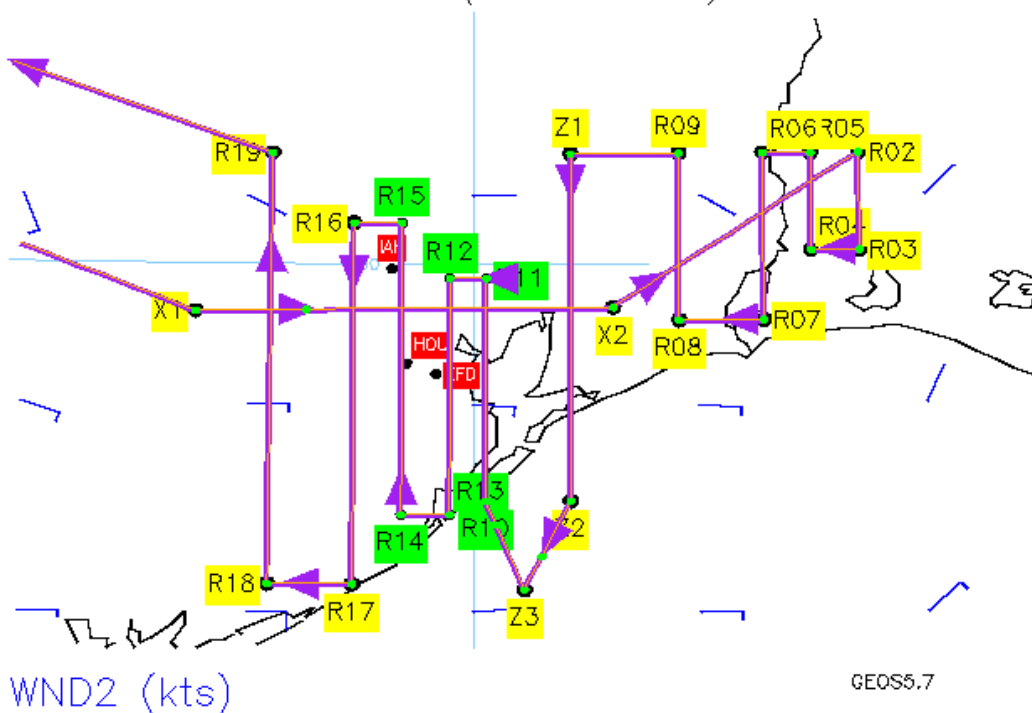


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

Requested waypoints (approximate):

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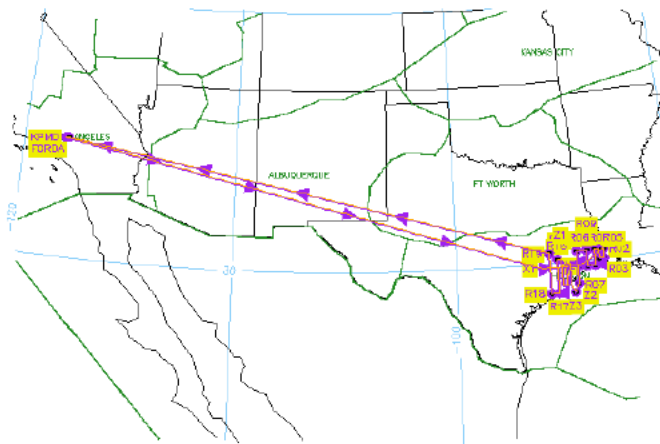
# Atom-3 Test Flight #1

version 11 (2017-09-08)

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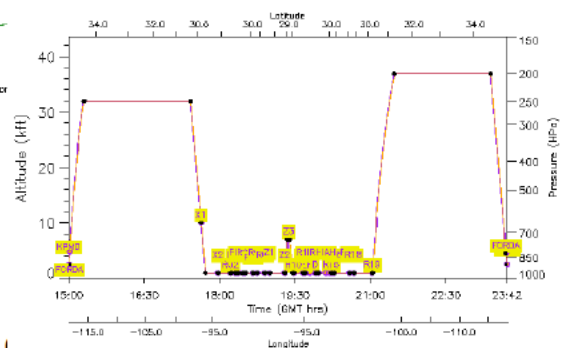
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Duration: ~ 9 hrs



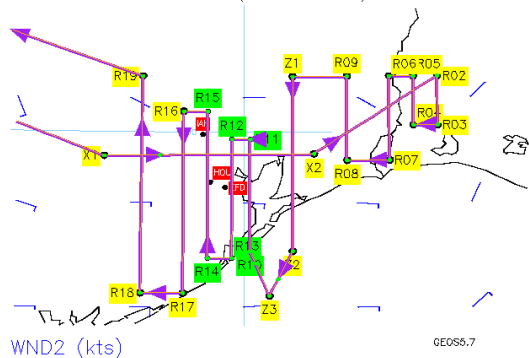
TCEQ-0184

# Flight TF1: Palmdale-Houston-Palmdale, continued

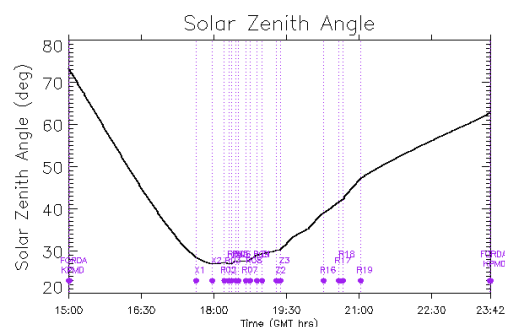
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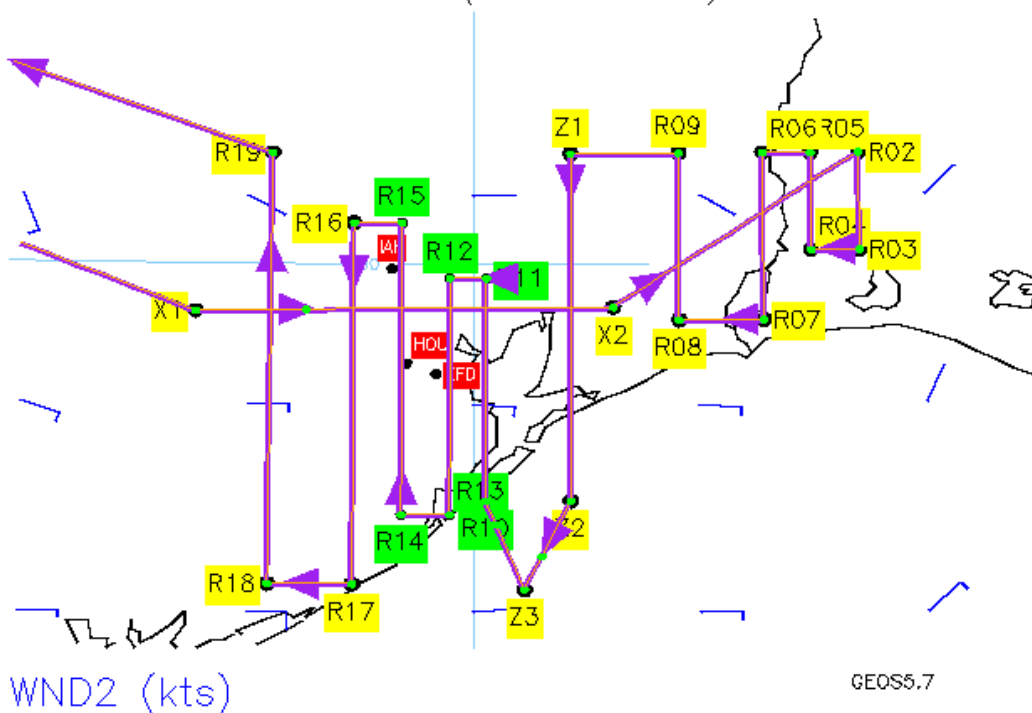
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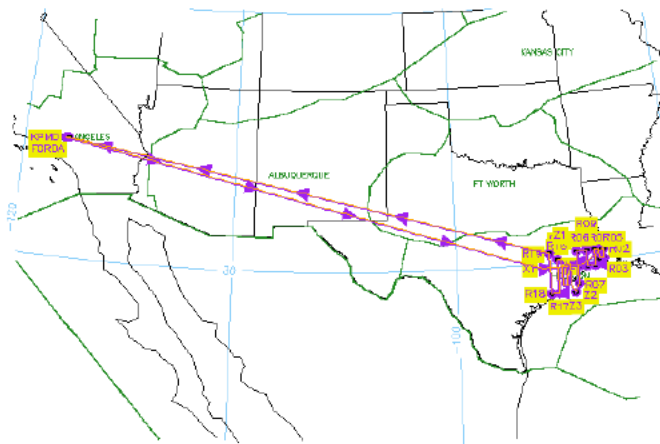
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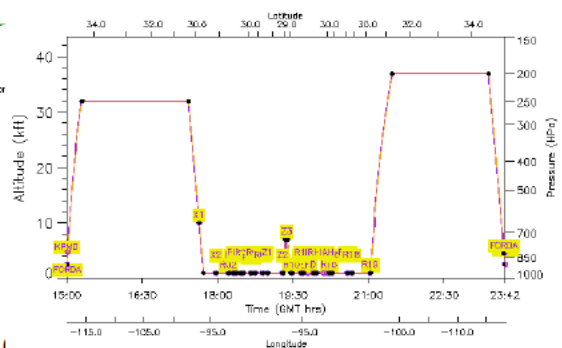
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(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



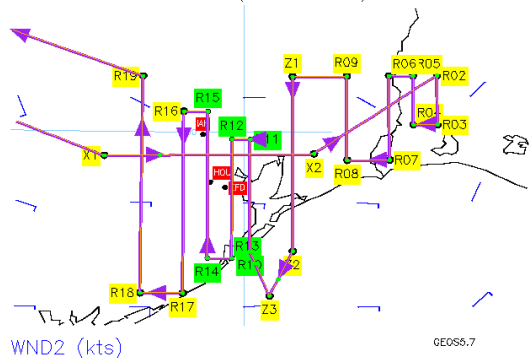
TCEQ-0190

# Flight TF1: Palmdale-Houston-Palmdale, continued

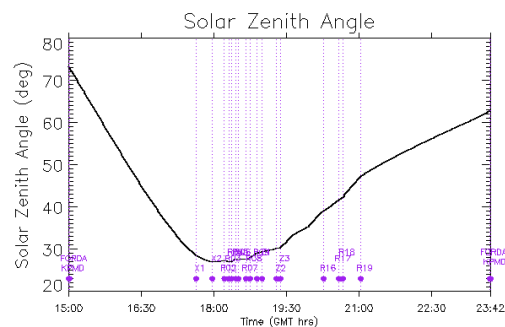
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Wind update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

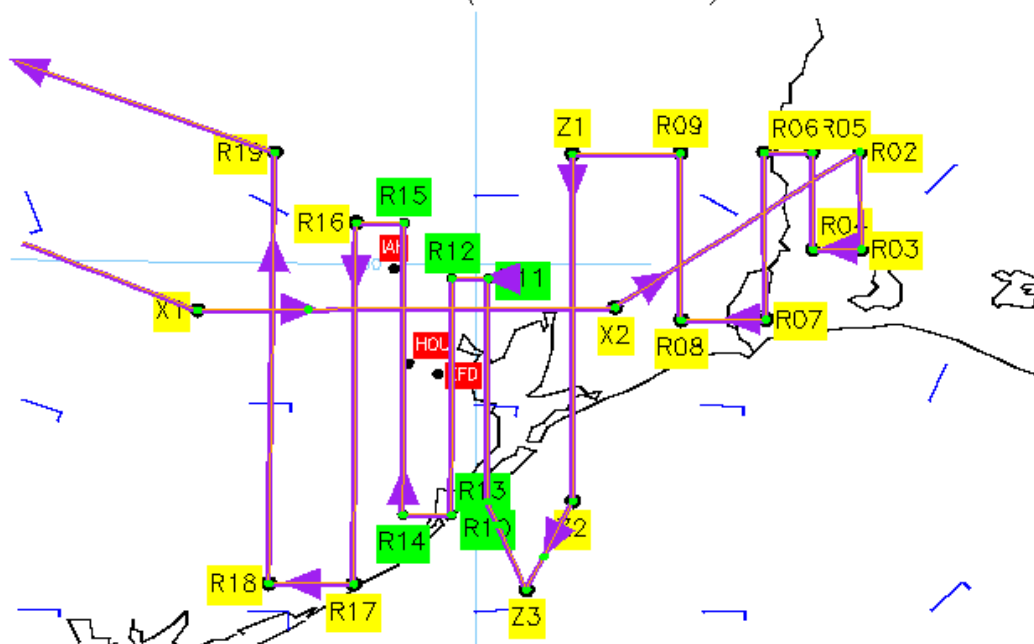
2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



(Larger copy of map on next page)



2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



WND2 (kts)

GEOS5.7

DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
R04 N 30° 03.000', W 093° 36.000'  
R05 N 30° 24.000', W 093° 36.000'  
R06 N 30° 24.000', W 093° 47.999'  
R07 N 29° 48.000', W 093° 47.999'  
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Z3 N 28° 49.902', W 094° 47.417'

R10: N 29° 09', W 094° 57.0'  
R11: N 29° 57', W 094° 57.0'  
R12: N 29° 57', W 095° 06.0'  
R13: N 29° 06', W 095° 06.0'  
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R17: N 28° 51', W 095° 30.0'  
R18: N 28° 51', W 095° 51.0'  
R19: N 30° 24', W 095° 50.4'

Note: way points are only approximate.

## Kelly Cook

---

**From:** Michael Honeycutt  
**Sent:** Sunday, September 10, 2017 10:57 AM  
**To:** Lori Wilson; Emily Lindley; Ashley K. Wadick; Ramiro Garcia; Kelly Cook; Ryan Vise; Tracy Miller; Susan Johnson; Sabine Lange; Lindsey Jones; Richard Chism; Andy Goodridge; Jonathan Walling  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Attachments:** Houston\_revb\_draft\_20170909.pdf; ATT00001.htm

Begin forwarded message:

**From:** "Lefer, Barry L. (HQ-DK000)" <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
**Subject:** **More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th**

David and Michael,

I wanted to reach out to you to provide you with as much information that you need regarding the proposed NASA DC-8 flight over southeastern Texas scheduled for Thursday, September 14<sup>th</sup>.

The NASA Atmospheric Tomography mission is preparing for a Pole-to-Pole sampling of background atmospheric composition, and the first test flight is scheduled for Thursday, September 14<sup>th</sup>. The science team thought that it could be interesting scientifically to sample the atmosphere of southeastern Texas as the region is recovering from Hurricane Harvey. The instrument payload (see <https://espo.nasa.gov/home/atom/instruments>) is not optimized for urban sampling, rather, for the opposite). Nevertheless, it could provide an interesting snapshot of the current conditions.

Attached is additional information, including our flight track and flight plans. We would like to work with EPA and TCEQ to provide both of you with the most useful data possible for your missions. From the NASA point of view, I want to stress two points regarding this effort:

**1. The design of this flight is regional in scope.** The overall goal is to assess the photochemical reactivity of the atmosphere and compare to the many earlier flights/campaigns in this region. The payload has superb capabilities for looking at the second stage products of photochemical pollution -- formaldehyde, peroxides, nitrates -- and the radical drivers (NO<sub>x</sub>, HO<sub>x</sub>). We can assess if large changes have followed the disaster. Small changes cannot be assessed this way.

**2. The ATom DC-8 will not (firstly, because it is not able to) sample emissions from facilities in any effective way.** All our VOC observations are time averaged (flasks; on-board GCs). Facility emissions are not the focus of the flight that we have planned. We should not in any way duplicate or interfere with Texas data collection or dissemination of information, as far as I can tell.

I will be available Sunday night, all-day Monday and all-day Tuesday. Please contact me via email or phone and I would be happy to work with you to answer your questions and try to address any concerns.

Best regards. Sincerely, Barry

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Barry Lefer

Program Manager, Tropospheric Composition Program  
ATom Program Scientist  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

***The NASA DC-8 is planning to carry out on 14 Sep 2017 a survey flight of atmospheric photochemical reactivity, focused on the regional scale, over the Gulf coast area of Texas affected by flooding from Hurricane Harvey.***

The massive floods in Houston have caused environmental damage with many dimensions. VOCs have been mobilized, vegetation and structures have been destroyed, mold, disturbed soil, and muck are widely distributed, heavy industry and transportation have been disrupted. A great deal of construction equipment activity is currently taking place as part of the clean-up, which might lead to elevated concentrations of NO<sub>x</sub>.

The DC-8 is currently loaded with a full payload of chemistry instrumentation in preparation for the imminent departure on a global mission, the Atmospheric Tomography Mission (ATom, 3<sup>rd</sup> deployment). The coincidence of ATom with the aftermath of flooding in Houston and Beaumont provides the opportunity to assess lingering pollution effects at regional scale. The date for the flight has been set to Thursday 14 Sep 2017, in the afternoon.

Our goal for this flight is to examine whether there have been *major shifts compared to the typical atmospheric environment in Houston and vicinity in the aftermath of the storm*. Our DC-8 payload has excellent real time NO<sub>x</sub>, O<sub>3</sub>, formaldehyde, HO<sub>x</sub>, CO, and reactive intermediates, plus total nitrate and sulfate, and tracers. We also have a superb real-time aerosol suite including a number of aspects composition (e.g. PALMS, AMS). We will compare the observations from this flight to the large data sets already existing for Houston, from previous studies.

A much larger number of species, especially VOCs, can be measured on our payload, in time-averaged sampling. We can take up to 168 WAS flask samples, a comparable number of TOGA samples (30 s averages, every 2.5 minutes), and 42 PFPs (for halocarbons etc). Note that we do not have a PTRMS or other sensor to measure VOCs rapidly. This payload, and a plane as big and fast as the DC-8, is not suitable to measure point sources of VOCs or related materials. Thus facility scale emissions are not the focus of our planned measurements.

The planned measurements will not duplicate any of the data being collected by the State of Texas or by the US EPA. The DC-8 is focused on the regional scale – the Big Picture.

The following pages provide a schematic of the planned flight track.

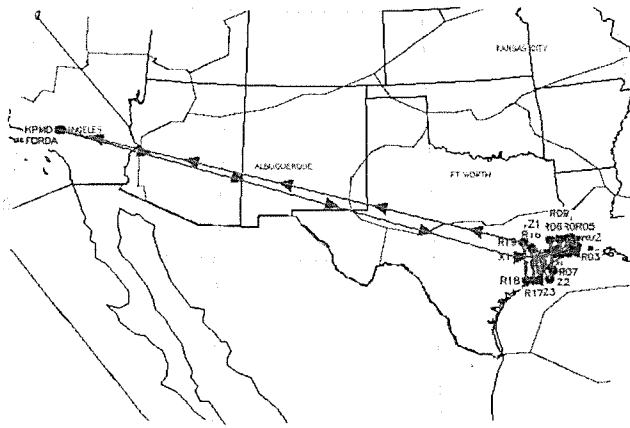
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

- It is important to begin the pattern no earlier than local noon. Arrival time on-station is planned for around 18:00 UTC (1:00 PM CDT).
- Speed/pitch/yaw maneuvers are desired. No MMS box will be done, in the interest of maximizing time on station.
- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

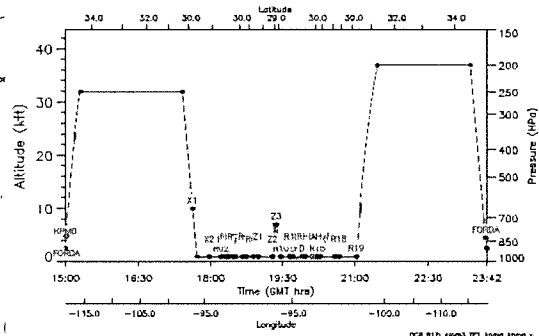
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs

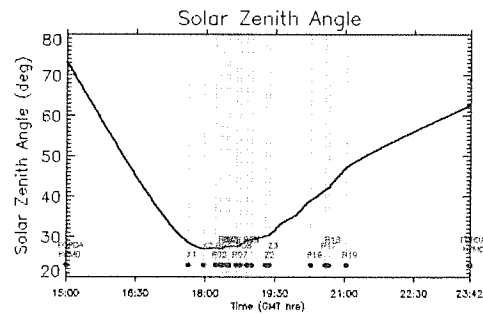
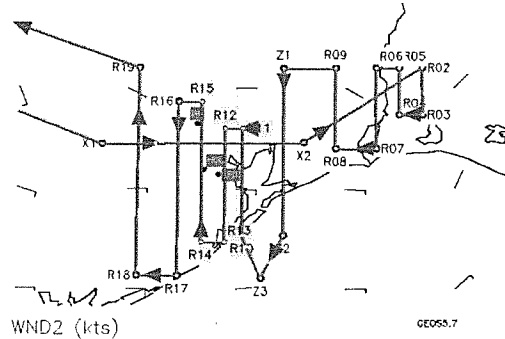


*Flight TF1: Palmdale-Houston-Palmdale, continued*

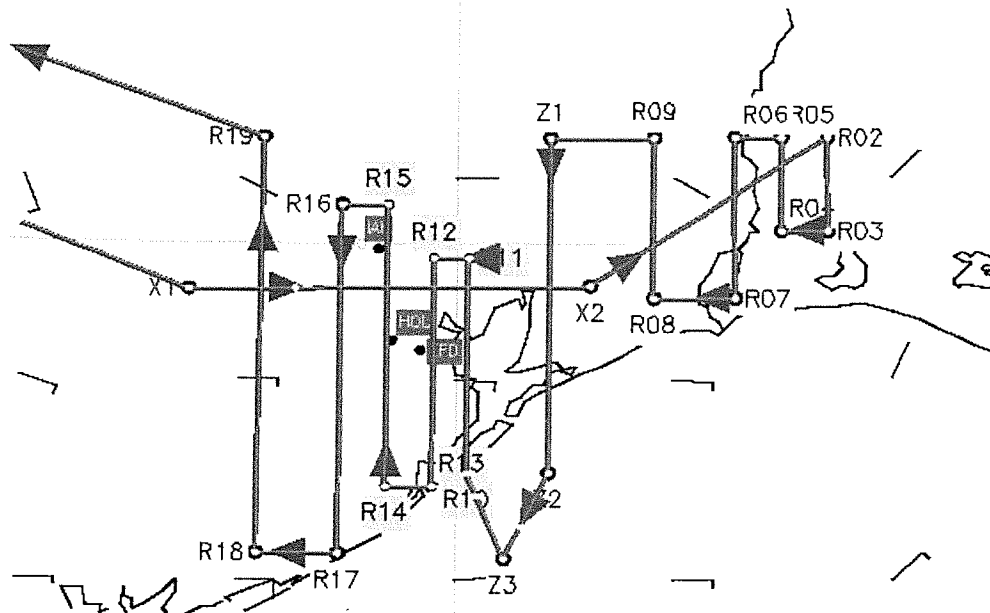
Notes:

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- Descend to ~ 10,000 ft at point X1, then
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- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
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- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Will update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



WIND2 (kts)

GEOS5.7

DC8 B17: storm3\_FTL\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)



Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
R04 N 30° 03.000', W 093° 36.000'  
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**From:** [Michael Honeycutt](#)  
**To:** [Lori Wilson](#); [Emily Lindley](#); [Ashley K. Wadick](#); [Ramiro Garcia](#); [Kelly Cook](#); [Ryan Vise](#); [Tracy Miller](#); [Susan Johnson](#); [Sabine Lange](#); [Lindsey Jones](#); [Richard Chism](#); [Andy Goodridge](#); [Jonathan Walling](#)  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 10:57:00 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[ATT00001.htm](#)

---

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**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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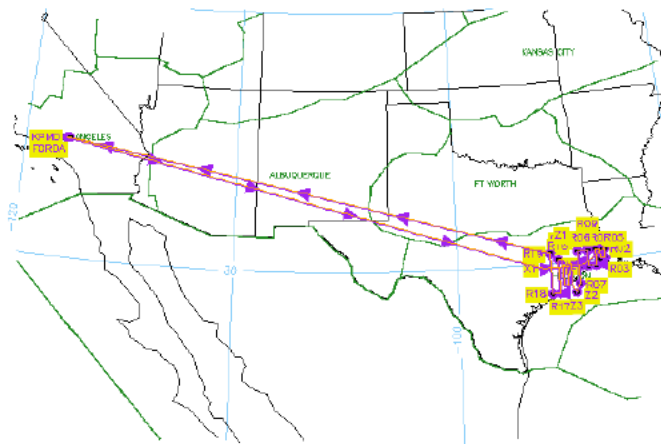
# Atom-3 Test Flight #1

version 11 (2017-09-08)

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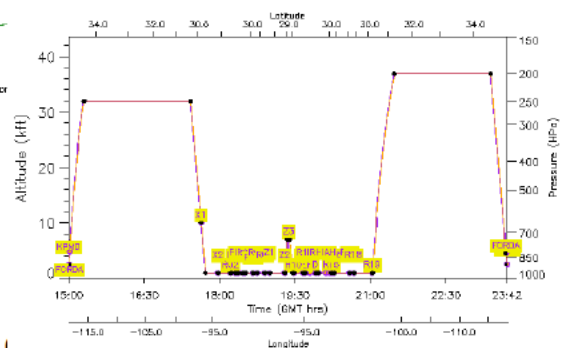
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(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



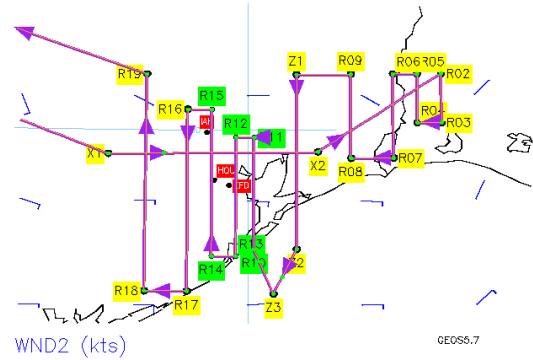
TCEQ-0202

# Flight TF1: Palmdale-Houston-Palmdale, continued

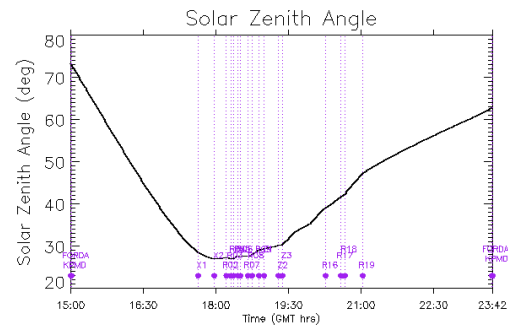
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2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

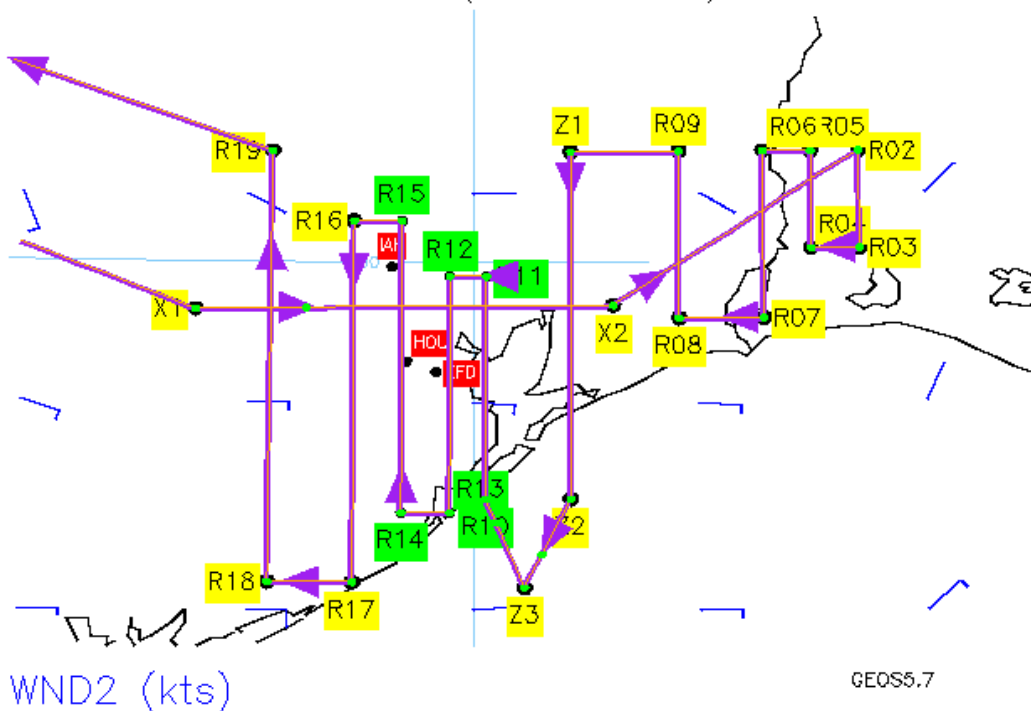


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



WND2 (kts)

GEOS5.7

DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

TCEQ-0203

Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
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R02 N 30° 24.000', W 093° 24.000'  
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# DRAFT E-MAIL

---

**From:** Michael.Honeycutt@tceq.texas.gov  
**Sent:** Sunday, September 10, 2017 10:57 AM  
**To:** Lori Wilson; Emily Lindley; Ashley K. Wadick; Ramiro Garcia; Kelly Cook; Ryan Vise; Tracy Miller; Susan Johnson; Sabine Lange; Lindsey Jones; Richard Chism; Andy Goodridge; Jonathan Walling  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Attachments:** Houston\_revb\_draft\_20170909.pdf; ATT00001.htm

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**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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202.358.3857 (o)  
202.769.9064 (c)

**From:** Lori.Wilson@tceq.texas.gov  
**To:** [Richard Hyde](#)  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 11:25:18 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[ATT00001.htm](#)

---

Didn't know if you are discussing with Sam?

Sent from my iPhone

Begin forwarded message:

**From:** Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
**Date:** September 10, 2017 at 10:56:57 AM CDT  
**To:** Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>, Lindsey Jones <[Lindsey.Jones@tceq.texas.gov](mailto:Lindsey.Jones@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Andy Goodridge <[Andy.Goodridge@tceq.texas.gov](mailto:Andy.Goodridge@tceq.texas.gov)>, Jonathan Walling <[jonathan.walling@tceq.texas.gov](mailto:jonathan.walling@tceq.texas.gov)>  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

Begin forwarded message:

**From:** "Lefer, Barry L. (HQ-DK000)" <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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ATom Program Scientist  
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NASA Headquarters  
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202.358.3857 (o)  
202.769.9064 (c)

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The following pages provide a schematic of the planned flight track.

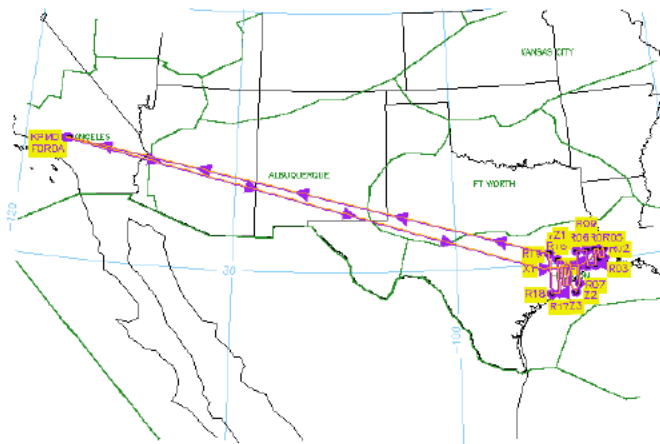
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

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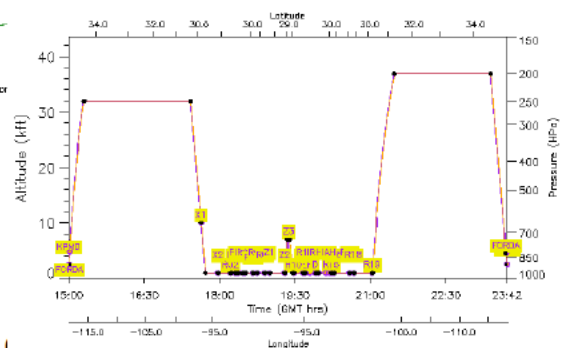
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



TCEQ-0210



Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
R04 N 30° 03.000', W 093° 36.000'  
R05 N 30° 24.000', W 093° 36.000'  
R06 N 30° 24.000', W 093° 47.999'  
R07 N 29° 48.000', W 093° 47.999'  
R08 N 29° 48.000', W 094° 09.000'  
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Z1 N 30° 24.000', W 094° 36.000'  
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Z3 N 28° 49.902', W 094° 47.417'

R10: N 29° 09', W 094° 57.0'  
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R12: N 29° 57', W 095° 06.0'  
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**From:** Emily Lindley  
**To:** [Stephanie Bergeron Perdue](#)  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 1:37:48 PM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[ATT00001.htm](#)

---

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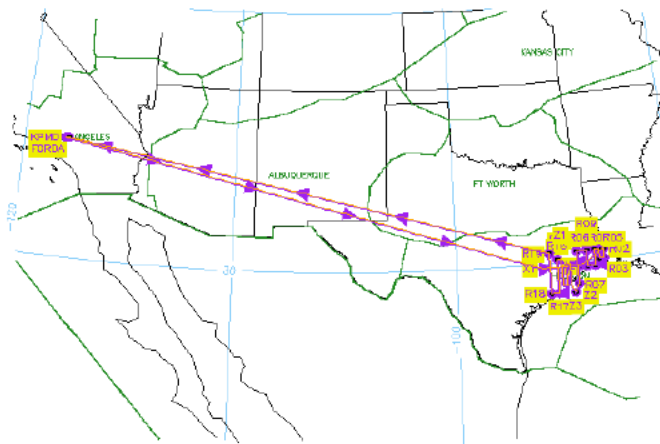
# Atom-3 Test Flight #1

version 11 (2017-09-08)

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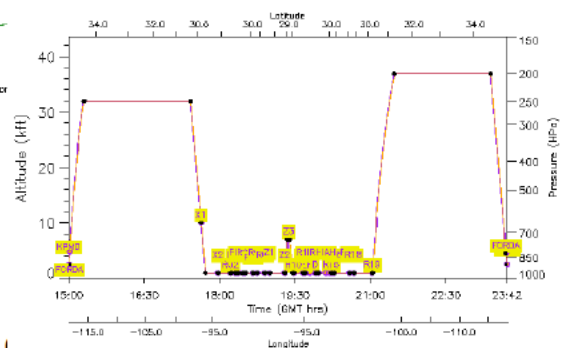
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(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
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Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs

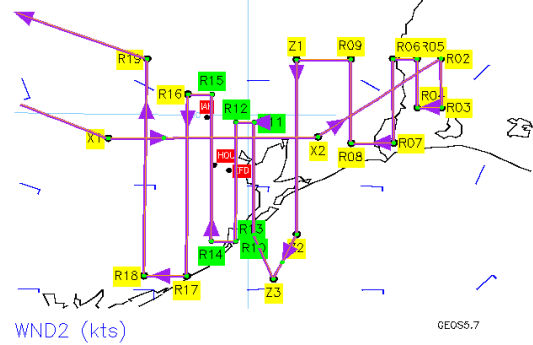


# Flight TF1: Palmdale-Houston-Palmdale, continued

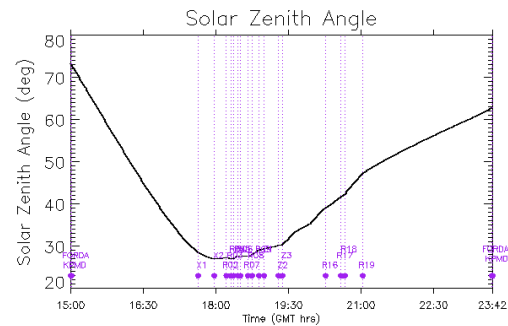
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Wind update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

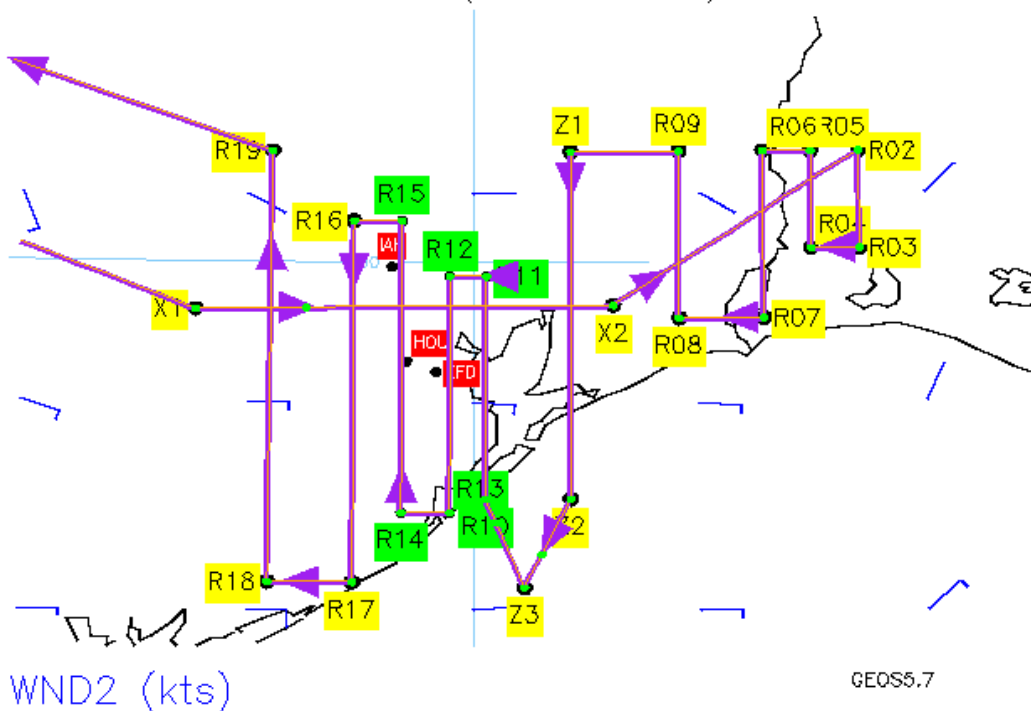


(Larger copy of map on next page)



DCB B17: atm3\_JFL\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



WND2 (kts)

GEOS5.7

DCB B17: atm3\_JFL\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

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**From:** [Stephanie Bergeron Perdue](#)  
**To:** [Emily Lindley](#)  
**Subject:** Re: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Sunday, September 10, 2017 3:12:42 PM

---

Thx

Sent from my iPhone

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<Houston\_revb\_draft\_20170909.pdf>



# DRAFT E-MAIL

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**Sent:** Sunday, September 10, 2017 3:13 PM  
**To:** Emily Lindley  
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**Date:** September 10, 2017 at 10:56:57 AM CDT  
**To:** Lori Wilson <[Lori.Wilson@tceq.texas.gov](mailto:Lori.Wilson@tceq.texas.gov)>, Emily Lindley <[Emily.Lindley@tceq.texas.gov](mailto:Emily.Lindley@tceq.texas.gov)>, "Ashley K. Wadick" <[Ashley.K.Wadick@tceq.texas.gov](mailto:Ashley.K.Wadick@tceq.texas.gov)>, Ramiro Garcia <[ramiro.garcia@tceq.texas.gov](mailto:ramiro.garcia@tceq.texas.gov)>, Kelly Cook <[kelly.cook@tceq.texas.gov](mailto:kelly.cook@tceq.texas.gov)>, Ryan Vise <[Ryan.Vise@Tceq.Texas.Gov](mailto:Ryan.Vise@Tceq.Texas.Gov)>, Tracy Miller <[tracy.miller@tceq.texas.gov](mailto:tracy.miller@tceq.texas.gov)>, Susan Johnson <[susan.johnson@tceq.texas.gov](mailto:susan.johnson@tceq.texas.gov)>, Sabine Lange <[Sabine.Lange@tceq.texas.gov](mailto:Sabine.Lange@tceq.texas.gov)>, Lindsey Jones <[Lindsey.Jones@tceq.texas.gov](mailto:Lindsey.Jones@tceq.texas.gov)>, Richard Chism <[Richard.Chism@tceq.texas.gov](mailto:Richard.Chism@tceq.texas.gov)>, Andy Goodridge <[Andy.Goodridge@tceq.texas.gov](mailto:Andy.Goodridge@tceq.texas.gov)>, Jonathan Walling <[jonathan.walling@tceq.texas.gov](mailto:jonathan.walling@tceq.texas.gov)>  
**Subject:** Fwd: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

Begin forwarded message:

**From:** "Lefer, Barry L. (HQ-DK000)" <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Date:** September 10, 2017 at 10:49:36 AM CDT  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
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202.769.9064 (c)

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**Date:** Monday, September 11, 2017 7:14:17 AM

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**Sent:** Saturday, September 09, 2017 10:57 AM  
**To:** Gray, David <gray.david@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Richard Hyde <richard.hyde@tceq.texas.gov>; Michael Honeycutt <Michael.honeycutt@tceq.texas.gov>; Rauscher, Jon <Rauscher.Jon@epa.gov>; Crossland, Ronnie <Crossland.Ronnie@epa.gov>  
**Cc:** Freilich, Michael H. (HQ-DK000) <mhf@nasa.gov>; Friedl, Lawrence A. (HQ-DK000) <lfriedl@nasa.gov>  
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**TCEQ-0225**

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**Attachments:** [image001.png](#)

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**Subject:** FW: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Monday, September 11, 2017 8:23:22 AM  
**Attachments:** [image001.png](#)

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***The NASA DC-8 is planning to carry out on 14 Sep 2017 a survey flight of atmospheric photochemical reactivity, focused on the regional scale, over the Gulf coast area of Texas affected by flooding from Hurricane Harvey.***

The massive floods in Houston have caused environmental damage with many dimensions. VOCs have been mobilized, vegetation and structures have been destroyed, mold, disturbed soil, and muck are widely distributed, heavy industry and transportation have been disrupted. A great deal of construction equipment activity is currently taking place as part of the clean-up, which might lead to elevated concentrations of NO<sub>x</sub>.

The DC-8 is currently loaded with a full payload of chemistry instrumentation in preparation for the imminent departure on a global mission, the Atmospheric Tomography Mission (ATom, 3<sup>rd</sup> deployment). The coincidence of ATom with the aftermath of flooding in Houston and Beaumont provides the opportunity to assess lingering pollution effects at regional scale. The date for the flight has been set to Thursday 14 Sep 2017, in the afternoon.

Our goal for this flight is to examine whether there have been *major shifts compared to the typical atmospheric environment in Houston and vicinity in the aftermath of the storm*. Our DC-8 payload has excellent real time NO<sub>x</sub>, O<sub>3</sub>, formaldehyde, HO<sub>x</sub>, CO, and reactive intermediates, plus total nitrate and sulfate, and tracers. We also have a superb real-time aerosol suite including a number of aspects composition (e.g. PALMS, AMS). We will compare the observations from this flight to the large data sets already existing for Houston, from previous studies.

A much larger number of species, especially VOCs, can be measured on our payload, in time-averaged sampling. We can take up to 168 WAS flask samples, a comparable number of TOGA samples (30 s averages, every 2.5 minutes), and 42 PFPs (for halocarbons etc). Note that we do not have a PTRMS or other sensor to measure VOCs rapidly. This payload, and a plane as big and fast as the DC-8, is not suitable to measure point sources of VOCs or related materials. Thus facility scale emissions are not the focus of our planned measurements.

The planned measurements will not duplicate any of the data being collected by the State of Texas or by the US EPA. The DC-8 is focused on the regional scale – the Big Picture.

The following pages provide a schematic of the planned flight track.

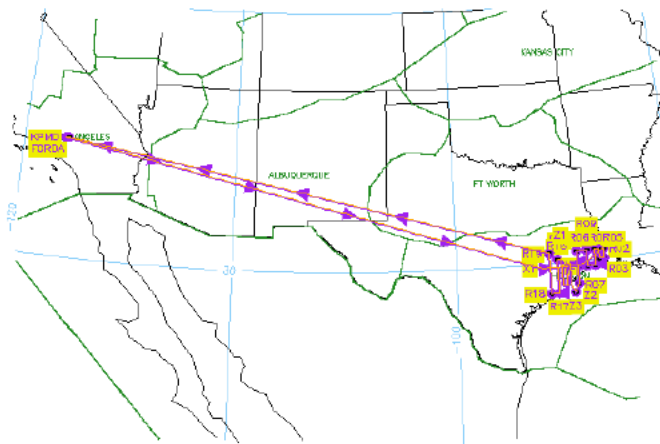
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

- It is important to begin the pattern no earlier than local noon. Arrival time on-station is planned for around 18:00 UTC (1:00 PM CDT).
- Speed/pitch/yaw maneuvers are desired. No MMS box will be done, in the interest of maximizing time on station.
- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

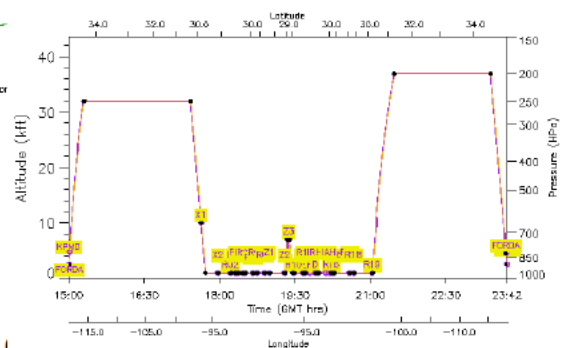
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



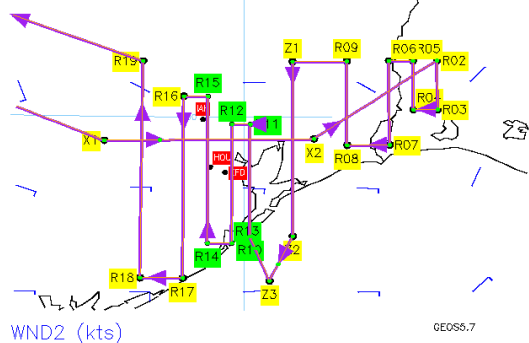
TCEQ-0249

# Flight TF1: Palmdale-Houston-Palmdale, continued

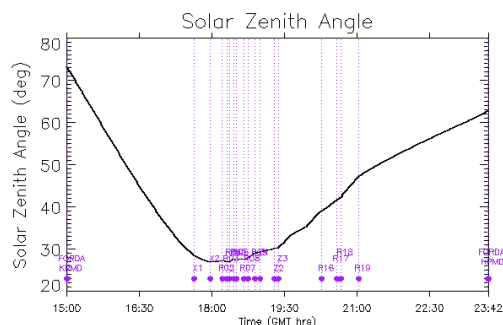
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

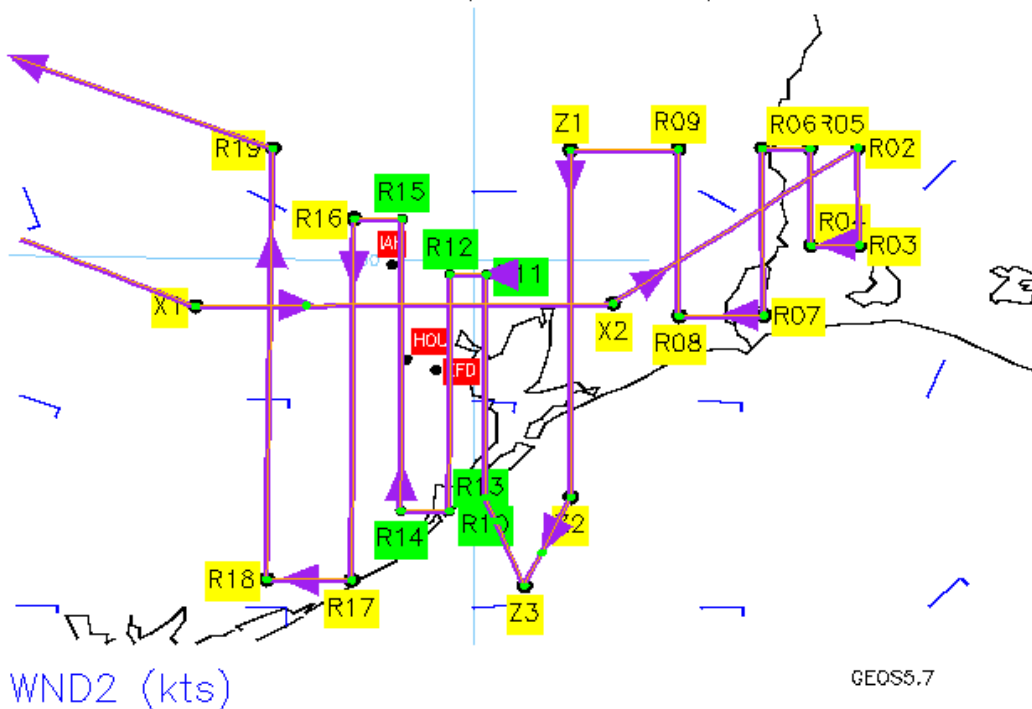


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
R03 N 30° 03.000', W 093° 24.000'  
R04 N 30° 03.000', W 093° 36.000'  
R05 N 30° 24.000', W 093° 36.000'  
R06 N 30° 24.000', W 093° 47.999'  
R07 N 29° 48.000', W 093° 47.999'  
R08 N 29° 48.000', W 094° 09.000'  
R09 N 30° 24.000', W 094° 09.000'  
Z1 N 30° 24.000', W 094° 36.000'  
Z2 N 29° 09.000', W 094° 36.000'  
Z3 N 28° 49.902', W 094° 47.417'

R10: N 29° 09', W 094° 57.0'  
R11: N 29° 57', W 094° 57.0'  
R12: N 29° 57', W 095° 06.0'  
R13: N 29° 06', W 095° 06.0'  
R14: N 29° 06', W 095° 18.0'  
R15: N 30° 09', W 095° 18.0'  
R16: N 30° 09', W 095° 30.0'  
R17: N 28° 51', W 095° 30.0'  
R18: N 28° 51', W 095° 51.0'  
R19: N 30° 24', W 095° 50.4'

Note: way points are only approximate.

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Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

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**From:** Lefer, Barry L. (HQ-DK000) [mailto:[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)]  
**Sent:** Sunday, September 10, 2017 10:50 AM  
**To:** David Gray <[gray.david@epa.gov](mailto:gray.david@epa.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>  
**Subject:** More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

David and Michael,

I wanted to reach out to you to provide you with as much information that you need regarding the proposed NASA DC-8 flight over southeastern Texas scheduled for Thursday, September 14<sup>th</sup>.

The NASA Atmospheric Tomography mission is preparing for a Pole-to-Pole sampling of background atmospheric composition, and the first test flight is scheduled for Thursday, September 14<sup>th</sup>. The science team thought that it could be interesting scientifically to sample the atmosphere of southeastern Texas as the region is recovering from Hurricane Harvey. The instrument payload (see <https://espo.nasa.gov/home/atom/instruments>) is not optimized for urban sampling, rather, for the opposite). Nevertheless, it could provide an interesting snapshot of the current conditions.

Attached is additional information, including our flight track and flight plans. We would like to work with EPA and TCEQ to provide both of you with the most useful data possible for your missions. From the NASA point of view, I want to stress two points regarding this effort:

**1. The design of this flight is regional in scope.** The overall goal is to assess the photochemical reactivity of the atmosphere and compare to the many earlier flights/campaigns in this region. The payload has superb capabilities for looking at the second stage products of photochemical pollution - formaldehyde, peroxides, nitrates -- and the radical drivers (NO<sub>x</sub>, HO<sub>x</sub>). We can assess if large changes have followed the disaster. Small changes cannot be assessed this way.

**2. The ATom DC-8 will not (firstly, because it is not able to) sample emissions from facilities in any effective way.** All our VOC observations are time averaged (flasks; on-board GCs). Facility emissions are not the focus of the flight that we have planned. We should not in any way duplicate or interfere with Texas data collection or dissemination of information, as far as I can tell.

I will be available Sunday night, all-day Monday and all-day Tuesday. Please contact me via email or phone and I would be happy to work with you to answer your questions and try to address any concerns.

Best regards. Sincerely, Barry

--

Barry Lefer  
Program Manager, Tropospheric Composition Program  
ATom Program Scientist  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)



***The NASA DC-8 is planning to carry out on 14 Sep 2017 a survey flight of atmospheric photochemical reactivity, focused on the regional scale, over the Gulf coast area of Texas affected by flooding from Hurricane Harvey.***

The massive floods in Houston have caused environmental damage with many dimensions. VOCs have been mobilized, vegetation and structures have been destroyed, mold, disturbed soil, and muck are widely distributed, heavy industry and transportation have been disrupted. A great deal of construction equipment activity is currently taking place as part of the clean-up, which might lead to elevated concentrations of NO<sub>x</sub>.

The DC-8 is currently loaded with a full payload of chemistry instrumentation in preparation for the imminent departure on a global mission, the Atmospheric Tomography Mission (ATom, 3<sup>rd</sup> deployment). The coincidence of ATom with the aftermath of flooding in Houston and Beaumont provides the opportunity to assess lingering pollution effects at regional scale. The date for the flight has been set to Thursday 14 Sep 2017, in the afternoon.

Our goal for this flight is to examine whether there have been *major shifts compared to the typical atmospheric environment in Houston and vicinity in the aftermath of the storm*. Our DC-8 payload has excellent real time NO<sub>x</sub>, O<sub>3</sub>, formaldehyde, HO<sub>x</sub>, CO, and reactive intermediates, plus total nitrate and sulfate, and tracers. We also have a superb real-time aerosol suite including a number of aspects composition (e.g. PALMS, AMS). We will compare the observations from this flight to the large data sets already existing for Houston, from previous studies.

A much larger number of species, especially VOCs, can be measured on our payload, in time-averaged sampling. We can take up to 168 WAS flask samples, a comparable number of TOGA samples (30 s averages, every 2.5 minutes), and 42 PFPs (for halocarbons etc). Note that we do not have a PTRMS or other sensor to measure VOCs rapidly. This payload, and a plane as big and fast as the DC-8, is not suitable to measure point sources of VOCs or related materials. Thus facility scale emissions are not the focus of our planned measurements.

The planned measurements will not duplicate any of the data being collected by the State of Texas or by the US EPA. The DC-8 is focused on the regional scale – the Big Picture.

The following pages provide a schematic of the planned flight track.

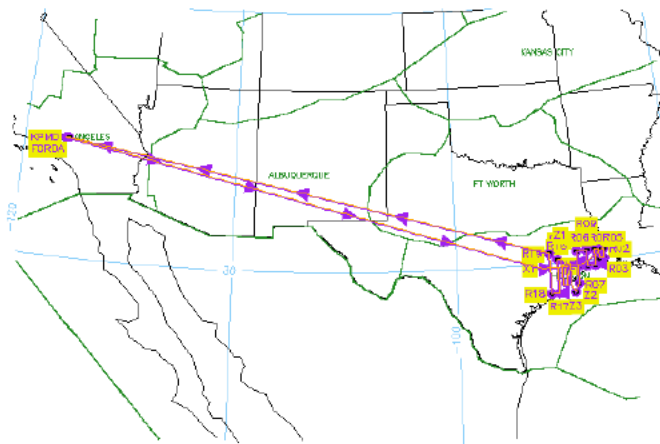
# Atom-3 Test Flight #1

version 11 (2017-09-08)

## Notes:

- It is important to begin the pattern no earlier than local noon. Arrival time on-station is planned for around 18:00 UTC (1:00 PM CDT).
- Speed/pitch/yaw maneuvers are desired. No MMS box will be done, in the interest of maximizing time on station.
- As usual, don't take the plans and paths shown too literally. Altitudes are notional. No corrections for winds have been made.

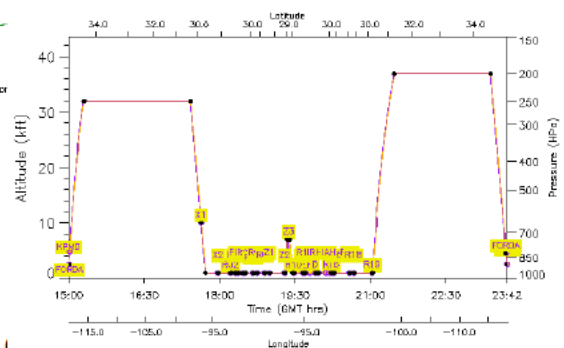
## Flight TF2: Palmdale-Houston-Palmdale



(See next page for close-up view of Houston))

Takeoff: 2017-09-14T15:00 UTC  
(8:00 AM PDT)  
Landing: 2017-09-15T00:00 UTC  
(2017-09-14 5:00 PM PDT)

Duration: ~ 9 hrs



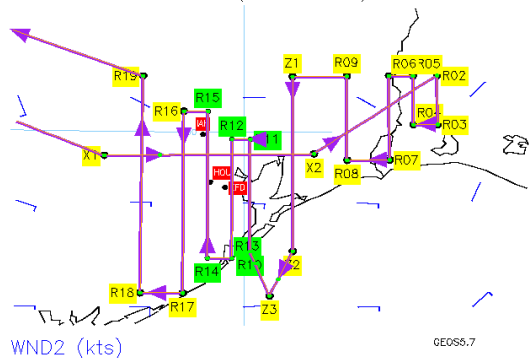
TCEQ-0255

# Flight TF1: Palmdale-Houston-Palmdale, continued

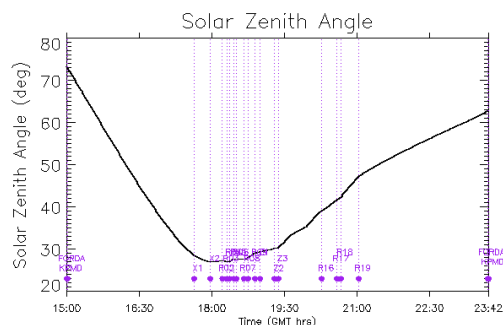
## Notes:

- Arrive near Houston around 18:00 UTC (1:00 PM CDT)
- Descend to ~ 10,000 ft at point X1, then
- Descend over Houston to 1000 ft (1 kft) at X2.
- Proceed at 1 kft to R02-R03-R04-R05-R06-R07-Z1-Z2.
- Ascend above boundary layer (~ 7 kft) on the way to Z3, then descend back down to 1 kft on the way to R10.
- Fly the pattern R10 through R19 at 1 kft. Legs R10-R11-R12-R13-R14-R15 are especially des red.
- Winds at 1000 ft are currently forecast light and variable (0 to 7 kts) out of the east. Winds at 7000 ft are more like 20 kts.
- Wind update forecasts as the flight day draws closer.
- The North-South orientation of the legs is set to be perpendicular to wind. This may need to be adjusted if updated forecasts shift the wind direction.

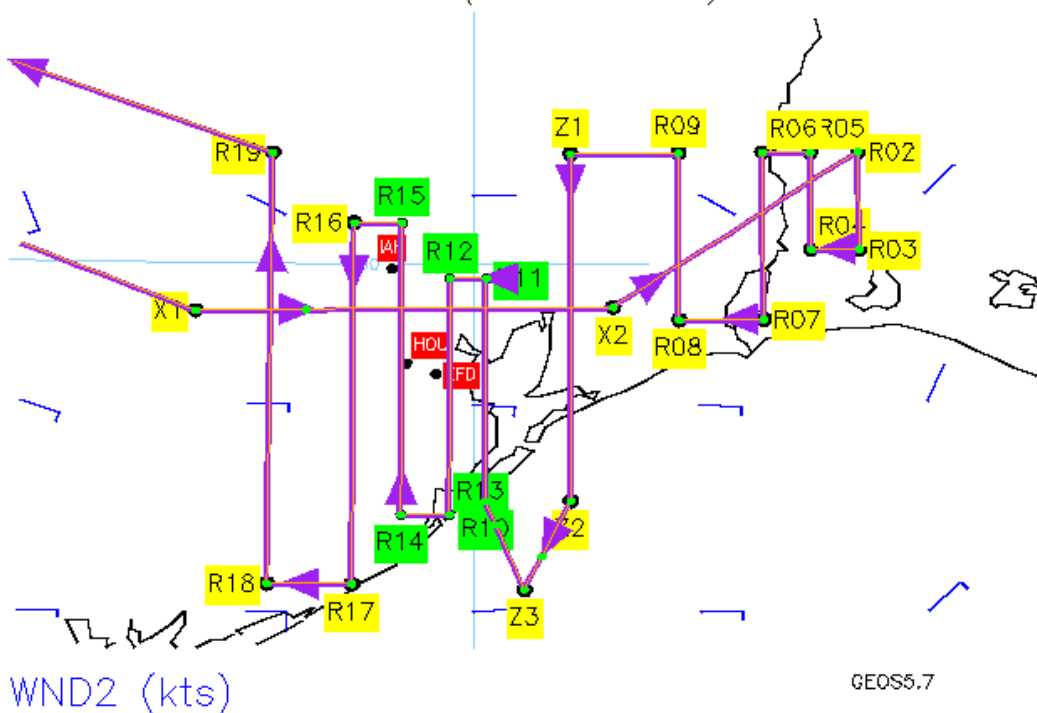
2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



(Larger copy of map on next page)



2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



(Dots w/ red labels are area air fields, shown for reference)

Requested waypoints (approximate):

X1 N 29° 49.830', W 096° 09.305'  
X2 N 29° 50.784', W 094° 25.386'

R02 N 30° 24.000', W 093° 24.000'  
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**From:** [Michael Honeycutt](#)  
**To:** [David Brymer](#)  
**Subject:** FW: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Monday, September 11, 2017 8:33:58 AM  
**Attachments:** [Houston\\_revb\\_draft\\_20170909.pdf](#)  
[image001.png](#)

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David,

I'm not sure how I got roped into this, but NASA is offering to do some flyovers. I'll follow up with some other emails. Haven't they done some work with you guys? Would this be useful? Right now, I think we're more interested in finding leaking sources than research.

Mike



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

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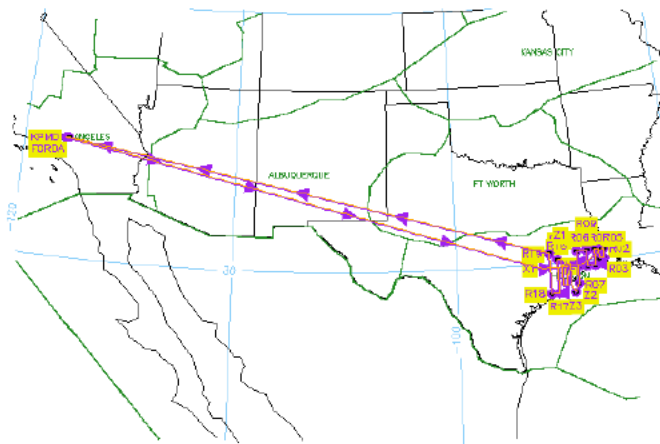
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version 11 (2017-09-08)

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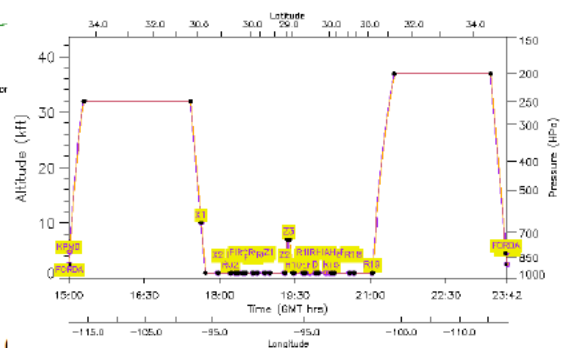
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Landing: 2017-09-15T00:00 UTC  
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TCEQ-0261

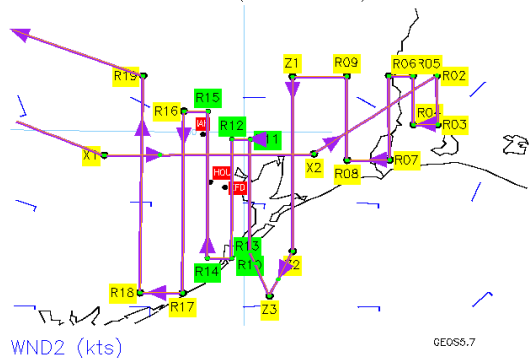


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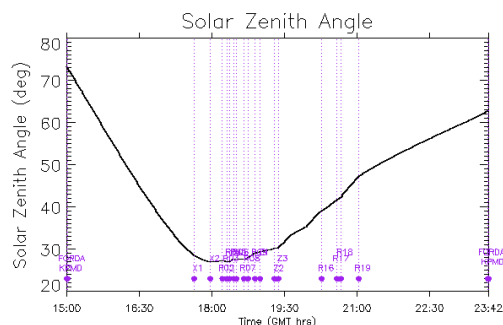
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2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa

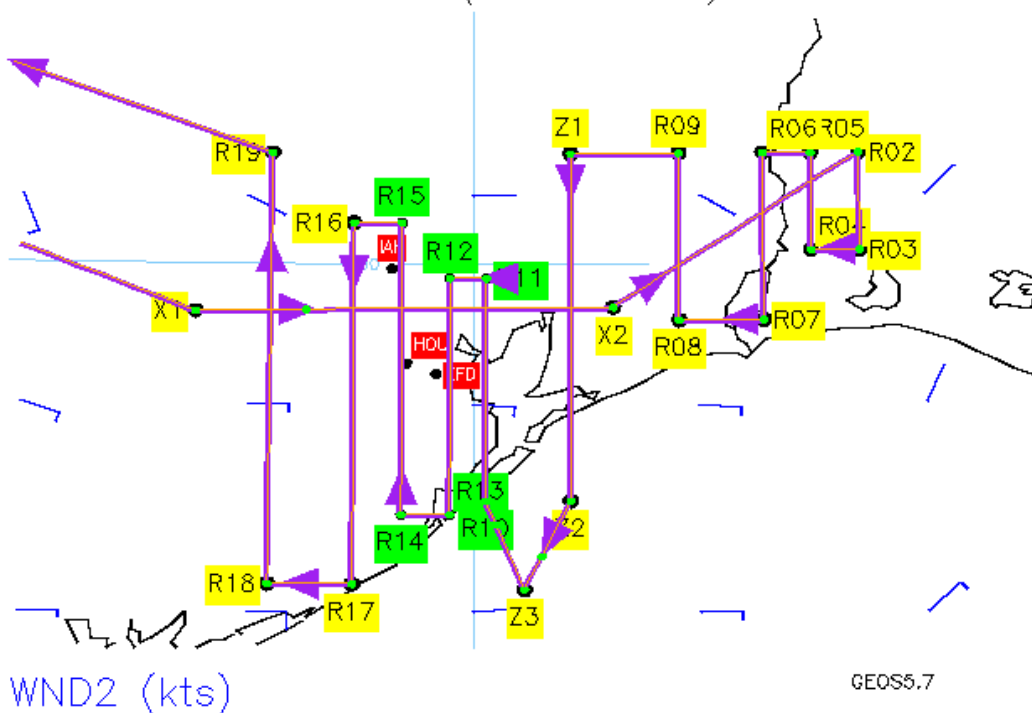


(Larger copy of map on next page)



DCB B17: atm3\_JF1\_komd\_komd v. 11

2017-09-14T20:00 UTC (192-hr fcst) at 950.0 HPa



DCB B17: atm3\_JF1\_komd\_komd v. 11

(Dots w/ red labels are area air fields, shown for reference)

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**From:** [Michael Honeycutt](#)  
**To:** [David Brymer](#)  
**Subject:** FW: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Monday, September 11, 2017 8:34:00 AM  
**Attachments:** [image001.png](#)

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Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Zurbuchen, Thomas H. (HQ-DA000) [<mailto:thomas.h.zurbuchen@nasa.gov>]  
**Sent:** Saturday, September 09, 2017 10:57 AM  
**To:** Gray, David <[gray.david@epa.gov](mailto:gray.david@epa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
**Cc:** Freilich, Michael H. (HQ-DK000) <[mhf@nasa.gov](mailto:mhf@nasa.gov)>; Friedl, Lawrence A. (HQ-DK000) <[lfriedl@nasa.gov](mailto:lfriedl@nasa.gov)>  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight

Dear Dr. David Grey, and team – I have asked our NASA team to coordinate with you directly. However, Dr. Mike Freilich (Director, Earth Science) is traveling internationally. I also cc-ed Lawrence Friedl, who runs applied programs. Our NASA team will be sure to connect with you directly before any final decision on planning and execution of this mission is made.

Enjoy the weekend.

Best,  
Thomas

---

**From:** "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>  
**Date:** Saturday, September 9, 2017 at 11:38 AM  
**To:** "Zurbuchen, Thomas H. (HQ-DA000)" <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>, "Kelly, Albert" <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>, Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>, Michael Honeycutt <[Michael.honeycutt@tceq.texas.gov](mailto:Michael.honeycutt@tceq.texas.gov)>, "Rauscher, Jon" <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>, "Crossland, Ronnie" <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
**Subject:** Coordination Follow-up: NASA Houston DC-8 flight

Dr Thomas Zurbuchen,

Based on the email thread attached, I am connecting us with TCEQ Executive Director Richard Hyde and Dr. Michael Honeycutt regarding your proposed mission to send the NASA DC-8 to spend several hours in southern Texas sampling atmospheric trace gases and aerosols - these include a full suite of Volatile Organic Compounds (VOCs) and several air toxics. I have also included our Toxicologist Jon Rausher.

We have a lot of monitoring and data being released by external sources including non-government organizations and the media which is leading to conflicting information.

The state has an air monitoring network in the area so we will need to ensure your efforts won't conflict with the ongoing work in the area. We also have our TAGA bus conducting air monitoring at ground level. EPA is also flying our own air monitoring surveillance aircraft ASPECT in the area so it may make more sense to direct your asset (as Sam suggested) to other facilities that we have not been able to reach yet.

Without fully understanding NASA capabilities – it is difficult to be certain to understand how best to deploy your asset. I am hesitant to have it collect additional information that overlaps our existing efforts until we know more.

We certainly appreciate your offer. Let's see what makes sense to this group. I am happy to setup a conference call if our teams can benefit from further discussion.

David Gray

**From:** [Michael Honeycutt](#)  
**To:** [David Brymer](#)  
**Subject:** FW: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Monday, September 11, 2017 8:34:00 AM  
**Attachments:** [image001.png](#)

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Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
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Phone: (512)239-1793  
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**From:** Gray, David [<mailto:gray.david@epa.gov>]  
**Sent:** Monday, September 11, 2017 7:14 AM  
**To:** Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Lefer, Barry L. (HQ-DK000) <[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)>  
**Subject:** RE: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

Dr. Honeycutt, We have assurances from NASA leadership (see below) that this mission will not proceed until both EPA and TCEQ sign off. EPA has expressed concerns with the proposed NASA mission creating confusion regarding how this proposal overlaps with EPA/TCEQ sampling analytical results in the area.

David

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**Cc:** Gray, David <[gray.david@epa.gov](mailto:gray.david@epa.gov)>

**Subject:** Re: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th

Thanks, Barry. I will forward your email to the appropriate TCEQ staff.

Mike

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202.358.3857 (o)  
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**To:** [David Brymer](#)  
**Subject:** FW: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
**Date:** Monday, September 11, 2017 8:34:00 AM  
**Attachments:** [image001.png](#)

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Dr Thomas Zurbuchen,

Based on the email thread attached, I am connecting us with TCEQ Executive Director Richard Hyde and Dr. Michael Honeycutt regarding your proposed mission to send the NASA DC-8 to spend several hours in southern Texas sampling atmospheric trace gases and aerosols - these include a full suite of Volatile Organic Compounds (VOCs) and several air toxics. I have also included our Toxicologist Jon Rausher.

We have a lot of monitoring and data being released by external sources including non-government organizations and the media which is leading to conflicting information.

The state has an air monitoring network in the area so we will need to ensure your efforts won't conflict with the ongoing work in the area. We also have our TAGA bus conducting air monitoring at ground level. EPA is also flying our own air monitoring surveillance aircraft ASPECT in the area so it may make more sense to direct your asset (as Sam suggested) to other facilities that we have not been able to reach yet.

Without fully understanding NASA capabilities – it is difficult to be certain to understand how best to deploy your asset. I am hesitant to have it collect additional information that overlaps our existing efforts until we know more.



We certainly appreciate your offer. Let's see what makes sense to this group. I am happy to setup a conference call if our teams can benefit from further discussion.

David Gray

**From:** [Michael Honeycutt](#)  
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**Subject:** RE: More information about the proposed DC-8 flight over Southeastern TX for Thursday September 14th  
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scientifically to sample the atmosphere of southeastern Texas as the region is recovering from Hurricane Harvey. The instrument payload (see <https://espo.nasa.gov/home/atom/instruments>) is not optimized for urban sampling, rather, for the opposite). Nevertheless, it could provide an interesting snapshot of the current conditions.

Attached is additional information, including our flight track and flight plans. We would like to work with EPA and TCEQ to provide both of you with the most useful data possible for your missions. From the NASA point of view, I want to stress two points regarding this effort:

**1. The design of this flight is regional in scope.** The overall goal is to assess the photochemical reactivity of the atmosphere and compare to the many earlier flights/campaigns in this region. The payload has superb capabilities for looking at the second stage products of photochemical pollution -- formaldehyde, peroxides, nitrates -- and the radical drivers (NO<sub>x</sub>, HO<sub>x</sub>). We can assess if large changes have followed the disaster. Small changes cannot be assessed this way.

**2. The ATom DC-8 will not (firstly, because it is not able to) sample emissions from facilities in any effective way.** All our VOC observations are time averaged (flasks; on-board GCs). Facility emissions are not the focus of the flight that we have planned. We should not in any way duplicate or interfere with Texas data collection or dissemination of information, as far as I can tell.

I will be available Sunday night, all-day Monday and all-day Tuesday. Please contact me via email or phone and I would be happy to work with you to answer your questions and try to address any concerns.

Best regards. Sincerely, Barry

--

Barry Lefer  
Program Manager, Tropospheric Composition Program  
ATom Program Scientist  
Earth Science Division  
NASA Headquarters  
[barry.lefer@nasa.gov](mailto:barry.lefer@nasa.gov)  
202.358.3857 (o)  
202.769.9064 (c)

<Houston\_revb\_draft\_20170909.pdf>

# DRAFT E-MAIL

---

**Sent:** Monday, September 11, 2017 9:23 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000); Gray, David; Kelly, Albert; Richard Hyde; Rauscher, Jon; Crossland, Ronnie; Lefer, Barry L. (HQ-DK000)  
**Cc:** Freilich, Michael H. (HQ-DK000); Friedl, Lawrence A. (HQ-DK000)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight

Dr. Zurbuchen,

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Best,  
Mike



Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality  
Phone: (512)239-1793  
Mobile: (512)623-0916  
E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Zurbuchen, Thomas H. (HQ-DA000) [mailto:thomas.h.zurbuchen@nasa.gov]  
**Sent:** Saturday, September 09, 2017 10:57 AM  
**To:** Gray, David <gray.david@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Richard Hyde <richard.hyde@tceq.texas.gov>; Michael Honeycutt <Michael.Honeycutt@tceq.texas.gov>; Rauscher, Jon <Rauscher.Jon@epa.gov>; Crossland, Ronnie <Crossland.Ronnie@epa.gov>  
**Cc:** Freilich, Michael H. (HQ-DK000) <mhf@nasa.gov>; Friedl, Lawrence A. (HQ-DK000) <lfriedl@nasa.gov>  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight

Dear Dr. David Grey, and team – I have asked our NASA team to coordinate with you directly. However, Dr. Mike Freilich (Director, Earth Science) is traveling internationally. I also cc-ed Lawrence Friedl, who runs applied programs. Our NASA team will be sure to connect with you directly before any final decision on planning and execution of this mission is made.

Enjoy the weekend.

Best,  
Thomas



---

**From:** "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>

**Date:** Saturday, September 9, 2017 at 11:38 AM

**To:** "Zurbuchen, Thomas H. (HQ-DA000)" <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>, "Kelly, Albert" <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>, Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>, Michael Honeycutt <[Michael.honeycutt@tceq.texas.gov](mailto:Michael.honeycutt@tceq.texas.gov)>, "Rauscher, Jon" <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>, "Crossland, Ronnie" <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>

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David Gray

**From:** [Michael Honeycutt](#)  
**To:** [Gray, David](#)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Monday, September 11, 2017 10:14:00 AM  
**Attachments:** [image001.png](#)

---

David,

Are you okay with us sending this response to the NASA folks?

Mike

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David Gray

**From:** Gray, David  
**To:** [Michael Honeycutt](#)  
**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Monday, September 11, 2017 10:17:34 AM  
**Attachments:** [image001.png](#)

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Yes

Sent from my iPhone

On Sep 11, 2017, at 10:15 AM, Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)> wrote:

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Mike

<image001.png> Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
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Phone: (512)239-1793  
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**To:** Zurbuchen, Thomas H. (HQ-DA000) <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>  
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**To:** [Zurbuchen, Thomas H. \(HQ-DA000\)](#); [Gray, David](#); [Kelly, Albert](#); [Richard Hyde](#); [Rauscher, Jon](#); [Crossland, Ronnie](#); [Lefer, Barry L. \(HQ-DK000\)](#); [Ramiro Garcia](#); [Kelly Cook](#)  
**Cc:** [Freilich, Michael H. \(HQ-DK000\)](#); [Friedl, Lawrence A. \(HQ-DK000\)](#)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Monday, September 11, 2017 10:20:37 AM  
**Attachments:** [image001.png](#)

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**Date:** Saturday, September 9, 2017 at 11:38 AM

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David Gray

## Kelly Cook

---

**From:** Michael Honeycutt  
**Sent:** Monday, September 11, 2017 10:21 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000); Gray, David; Kelly, Albert; Richard Hyde; Rauscher, Jon; Crossland, Ronnie; Lefer, Barry L. (HQ-DK000); Ramiro Garcia; Kelly Cook  
**Cc:** Freilich, Michael H. (HQ-DK000); Friedl, Lawrence A. (HQ-DK000)  
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E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

**From:** Zurbuchen, Thomas H. (HQ-DA000) [mailto:thomas.h.zurbuchen@nasa.gov]  
**Sent:** Saturday, September 09, 2017 10:57 AM  
**To:** Gray, David ; Kelly, Albert ; Richard Hyde ; Michael Honeycutt ; Rauscher, Jon ; Crossland, Ronnie  
**Cc:** Freilich, Michael H. (HQ-DK000) ; Friedl, Lawrence A. (HQ-DK000)  
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**From:** Gray, David <gray.david@epa.gov>  
**Sent:** Monday, September 11, 2017 2:09 PM  
**To:** Michael Honeycutt; Zurbuchen, Thomas H. (HQ-DA000); Richard Hyde; Lefer, Barry L. (HQ-DK000); Ramiro Garcia; Kelly Cook; Coleman, Sam  
**Cc:** Freilich, Michael H. (HQ-DK000); Friedl, Lawrence A. (HQ-DK000); Forsgren, Lee; Lightfoot, Robert M. (HQ-AI000); Zurbuchen, Thomas H. (HQ-DA000)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight

Thank you Dr. Honeycutt. EPA concurs with your assessment and we will not plan to ask NASA to conduct this mission.

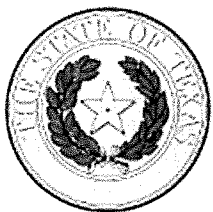
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so it may make more sense to direct your asset (as Sam suggested) to other facilities that we have not been able to reach yet.

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We certainly appreciate your offer. Let's see what makes sense to this group. I am happy to setup a conference call if our teams can benefit from further discussion.

David Gray



**From:** Gray, David  
**To:** [Michael Honeycutt](#); [Zurbuchen, Thomas H. \(HQ-DA000\)](#); [Richard Hyde](#); [Lefer, Barry L. \(HQ-DK000\)](#); [Ramiro Garcia](#); [Kelly Cook](#); [Coleman, Sam](#)  
**Cc:** [Freilich, Michael H. \(HQ-DK000\)](#); [Friedl, Lawrence A. \(HQ-DK000\)](#); [Forsgren, Lee](#); [Lightfoot, Robert M. \(HQ-AI000\)](#); [Zurbuchen, Thomas H. \(HQ-DA000\)](#)  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight  
**Date:** Monday, September 11, 2017 2:09:33 PM  
**Attachments:** [image002.png](#)

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Thank you Dr. Honeycutt. EPA concurs with your assessment and we will not plan to ask NASA to conduct this mission.

David Gray

---

**From:** Michael Honeycutt [mailto:Michael.Honeycutt@tceq.texas.gov]  
**Sent:** Monday, September 11, 2017 10:21 AM  
**To:** Zurbuchen, Thomas H. (HQ-DA000) <thomas.h.zurbuchen@nasa.gov>; Gray, David <gray.david@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Richard Hyde <richard.hyde@tceq.texas.gov>; Rauscher, Jon <Rauscher.Jon@epa.gov>; Crossland, Ronnie <Crossland.Ronnie@epa.gov>; Lefer, Barry L. (HQ-DK000) <barry.lefer@nasa.gov>; Ramiro Garcia <ramiro.garcia@tceq.texas.gov>; Kelly Cook <kelly.cook@tceq.texas.gov>  
**Cc:** Freilich, Michael H. (HQ-DK000) <mhf@nasa.gov>; Friedl, Lawrence A. (HQ-DK000) <lfriedl@nasa.gov>  
**Subject:** RE: Coordination Follow-up: NASA Houston DC-8 flight

Dr. Zurbuchen,

We appreciate your offer of help. Our stationary air monitors are now up and running and the data we are collecting are not showing levels of concern, even though many industries have already begun to restart their operations. We do not think we have wide-spread issues, but it is possible we have some localized sources. We are in the process of contracting with a company to do low-level flyovers with a helicopter equipped with an IR camera to see if we can find any such sources. At this time, we don't think your data would be useful for source identification while industry continues to restart their operations. Again, we sincerely appreciate your offer of help.

Best,  
Mike

Michael Honeycutt, Ph.D.  
Director, Toxicology Division  
Texas Commission on Environmental Quality

TCEQ-0302



Phone: (512)239-1793

Mobile: (512)623-0916

E-Mail: [michael.honeycutt@tceq.texas.gov](mailto:michael.honeycutt@tceq.texas.gov)

---

**From:** Zurbuchen, Thomas H. (HQ-DA000) [<mailto:thomas.h.zurbuchen@nasa.gov>]

**Sent:** Saturday, September 09, 2017 10:57 AM

**To:** Gray, David <[gray.david@epa.gov](mailto:gray.david@epa.gov)>; Kelly, Albert <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>; Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>; Michael Honeycutt <[Michael.Honeycutt@tceq.texas.gov](mailto:Michael.Honeycutt@tceq.texas.gov)>; Rauscher, Jon <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>; Crossland, Ronnie <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>

**Cc:** Freilich, Michael H. (HQ-DK000) <[mhf@nasa.gov](mailto:mhf@nasa.gov)>; Friedl, Lawrence A. (HQ-DK000) <[lfriedl@nasa.gov](mailto:lfriedl@nasa.gov)>

**Subject:** Re: Coordination Follow-up: NASA Houston DC-8 flight

Dear Dr. David Grey, and team – I have asked our NASA team to coordinate with you directly. However, Dr. Mike Freilich (Director, Earth Science) is traveling internationally. I also cc-ed Lawrence Friedl, who runs applied programs. Our NASA team will be sure to connect with you directly before any final decision on planning and execution of this mission is made.

Enjoy the weekend.

Best,  
Thomas

---

**From:** "Gray, David" <[gray.david@epa.gov](mailto:gray.david@epa.gov)>

**Date:** Saturday, September 9, 2017 at 11:38 AM

**To:** "Zurbuchen, Thomas H. (HQ-DA000)" <[thomas.h.zurbuchen@nasa.gov](mailto:thomas.h.zurbuchen@nasa.gov)>, "Kelly, Albert" <[kelly.albert@epa.gov](mailto:kelly.albert@epa.gov)>, Richard Hyde <[richard.hyde@tceq.texas.gov](mailto:richard.hyde@tceq.texas.gov)>, Michael Honeycutt <[Michael.honeycutt@tceq.texas.gov](mailto:Michael.honeycutt@tceq.texas.gov)>, "Rauscher, Jon" <[Rauscher.Jon@epa.gov](mailto:Rauscher.Jon@epa.gov)>, "Crossland, Ronnie" <[Crossland.Ronnie@epa.gov](mailto:Crossland.Ronnie@epa.gov)>

**Subject:** Coordination Follow-up: NASA Houston DC-8 flight

Dr Thomas Zurbuchen,

Based on the email thread attached, I am connecting us with TCEQ Executive Director Richard Hyde and Dr. Michael Honeycutt regarding your proposed mission to send the NASA

DC-8 to spend several hours in southern Texas sampling atmospheric trace gases and aerosols - these include a full suite of Volatile Organic Compounds (VOCs) and several air toxics. I have also included our Toxicologist Jon Rausher.

We have a lot of monitoring and data being released by external sources including non-government organizations and the media which is leading to conflicting information.

The state has an air monitoring network in the area so we will need to ensure your efforts won't conflict with the ongoing work in the area. We also have our TAGA bus conducting air monitoring at ground level. EPA is also flying our own air monitoring surveillance aircraft ASPECT in the area so it may make more sense to direct your asset (as Sam suggested) to other facilities that we have not been able to reach yet.

Without fully understanding NASA capabilities – it is difficult to be certain to understand how best to deploy your asset. I am hesitant to have it collect additional information that overlaps our existing efforts until we know more.

We certainly appreciate your offer. Let's see what makes sense to this group. I am happy to setup a conference call if our teams can benefit from further discussion.

David Gray

**From:** [Mark Estes](#)  
**To:** [Daphne McMurrer](#)  
**Cc:** [Stephen Davis](#)  
**Subject:** RE: NASA PIR 45334 and 45335--assign to OA-AMDA  
**Date:** Friday, February 1, 2019 10:38:59 AM  
**Attachments:** [Activity report September 2017.docx](#)

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Hi Daphne,

This is the document that is responsive to the PIR. It's the sixth bullet. I spoke on the telephone with Barry Lefer of NASA and Tom Ryerson of NOAA about bringing the NASA DC-8 to Houston to study air quality in the aftermath of Hurricane Harvey, and these are my notes on the matter. My notes are a brief summary, and represent more than one phone call. Our conversations took place on or after September 6, 2017. They were thinking of sampling in Houston with the NASA DC-8 on September 14, 2017. Just let me know if you have any questions.

Mark

---

**From:** Daphne McMurrer  
**Sent:** Friday, February 1, 2019 8:08 AM  
**To:** Jill Dickey <[jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)>; Mark Estes <[mark.estes@tceq.texas.gov](mailto:mark.estes@tceq.texas.gov)>; Jim Price <[jim.price@tceq.texas.gov](mailto:jim.price@tceq.texas.gov)>  
**Cc:** Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>  
**Subject:** RE: NASA PIR 45334 and 45335--assign to OA-AMDA

I'll take care of this if it turns out that AMDA does have e-mails that are related to the specific topics mentioned in the PIRs.

Mark, Jim,  
Let me know once you have figured this out.

---

**From:** Jill Dickey  
**Sent:** Friday, February 1, 2019 7:39 AM  
**To:** Daphne McMurrer <[Daphne.Mcmurrer@tceq.texas.gov](mailto:Daphne.Mcmurrer@tceq.texas.gov)>; Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>; Mark Estes <[mark.estes@tceq.texas.gov](mailto:mark.estes@tceq.texas.gov)>  
**Cc:** Stephen Davis <[stephen.davis@tceq.texas.gov](mailto:stephen.davis@tceq.texas.gov)>  
**Subject:** RE: NASA PIR 45334 and 45335--assign to OA-AMDA

Hi Lisa/Daphne,

Can you add OA-AMDA to PIRs 45334 and 45335?

Mark, I'm not sure who in your section has PIRs access. Let me know if you need help posting in PIRs.

Thanks,  
Jill

**Jill Dickey-Hull | Emissions Assessment Section |TCEQ**  
**12100 Park 35 Circle, Bldg. E | Austin, Texas 78753 | Mail: MC-164, P.O. Box 13087, Austin TX 78711-3087**

**Phone: (512) 239-5912 | Email: [jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)**

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**From:** Raj Nadkarni

**Sent:** Thursday, January 31, 2019 5:46 PM

**To:** Jill Dickey <[jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)>; Mark Estes <[mark.estes@tceq.texas.gov](mailto:mark.estes@tceq.texas.gov)>

**Cc:** Daphne McMurrer <[Daphne.Mcmurrer@tceq.texas.gov](mailto:Daphne.Mcmurrer@tceq.texas.gov)>; Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>

**Subject:** RE: NASA PIR 45334--do you have information?

Hello again, Mark may have some information. I do not. I added him to this chain and you can remove me.

Raj

---

**From:** Jill Dickey

**Sent:** Thursday, January 31, 2019 5:16 PM

**To:** Raj Nadkarni <[raj.nadkarni@tceq.texas.gov](mailto:raj.nadkarni@tceq.texas.gov)>

**Cc:** Daphne McMurrer <[Daphne.Mcmurrer@tceq.texas.gov](mailto:Daphne.Mcmurrer@tceq.texas.gov)>; Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>

**Subject:** NASA PIR 45334--do you have information?

Has anyone contacted you about possible responsive information for this PIR? Read request below.

If you'll have responsive, then Lisa D'Amato and Daphne know.

Thanks!

Jill

**Jill Dickey-Hull | Emissions Assessment Section |TCEQ**  
**12100 Park 35 Circle, Bldg. E | Austin, Texas 78753 | Mail: MC-164, P.O. Box 13087, Austin TX 78711-3087**

**Phone: (512) 239-5912 | Email: [jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)**

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**From:** Adam Bullock

**Sent:** Wednesday, January 30, 2019 8:15 AM

**To:** Jill Dickey <[jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)>; Daphne McMurrer <[Daphne.Mcmurrer@tceq.texas.gov](mailto:Daphne.Mcmurrer@tceq.texas.gov)>; Donna Cooper <[donna.cooper@tceq.texas.gov](mailto:donna.cooper@tceq.texas.gov)>  
**Cc:** Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>; Kevin Cauble <[kevin.cauble@tceq.texas.gov](mailto:kevin.cauble@tceq.texas.gov)>  
**Subject:** RE: Another one re: NASA PIR 45334

I have nothing on that, EAS was not involved in that project.

Maybe check with Raj.

Adam

---

**From:** Jill Dickey  
**Sent:** Tuesday, January 29, 2019 6:03 PM  
**To:** Daphne McMurrer <[Daphne.Mcmurrer@tceq.texas.gov](mailto:Daphne.Mcmurrer@tceq.texas.gov)>; Donna Cooper <[donna.cooper@tceq.texas.gov](mailto:donna.cooper@tceq.texas.gov)>  
**Cc:** Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>; Adam Bullock <[adam.bullock@tceq.texas.gov](mailto:adam.bullock@tceq.texas.gov)>; Kevin Cauble <[kevin.cauble@tceq.texas.gov](mailto:kevin.cauble@tceq.texas.gov)>  
**Subject:** RE: Another one re: NASA PIR 45334  
**Importance:** High

Draft--Internal

Before you assign to OA/EAS, let Adam check his emails. I'll let you know tomorrow morning. This is from the same requestor as 45331. I'm reading this request as 'the email needs to include Michael Honeycutt.' Is that how you are reading it?

FYI—I was referred to Julian Martinez in TCEQ legal who is now assigned the flyover contract.

**Jill Dickey-Hull | Emissions Assessment Section |TCEQ**  
**12100 Park 35 Circle, Bldg. E | Austin, Texas 78753 | Mail: MC-164, P.O. Box 13087, Austin TX 78711-3087**

**Phone: (512) 239-5912 | Email: [jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)**

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**From:** Daphne McMurrer  
**Sent:** Tuesday, January 29, 2019 5:25 PM  
**To:** Jill Dickey <[jill.dickey@tceq.texas.gov](mailto:jill.dickey@tceq.texas.gov)>; Donna Cooper <[donna.cooper@tceq.texas.gov](mailto:donna.cooper@tceq.texas.gov)>  
**Cc:** Lisa D'Amato <[lisa.DAmato@tceq.texas.gov](mailto:lisa.DAmato@tceq.texas.gov)>  
**Subject:** Another one re: NASA PIR 45334

Do you think anyone in AQD will have anything responsive for this one?

-----

**TCEQ-0307**

Susanne Rust

The Los Angeles Times

Lead Office: EXEC

Date Range: 9/8/2017-12/31/2017

Request:

Dear PIR Officer, I'd like all correspondence to, from, or including Michael Honeycutt and any TCEQ, EPA, NOAA and/ or NASA employee

regarding a NASA DC-8 that was to be deployed to survey the Houston area and measure air quality after Hurricane Harvey. Search terms could

include, but should not be limited to: air, hurricane, NASA, DC-8, TAGA, ASPECT, benzene, pollution, air quality, air pollution, measurement(s).

Thank you for your help and time. Susanne Rust

## Activity report for September 2017

Mark Estes

- I was invited to participate in a panel review of proposals to NASA in Washington, DC. The proposals were to support an airborne study of fire emissions and chemistry called FIREChem, which will take place during summer of 2019. The proposals generally fell into two groups: measurement studies, which would place an instrument on the aircraft and measure relevant chemical species, and technical flight planning, including forecast modeling, identification and selection of fires occurring on each flight day, and tracking the fire plumes downwind. I was mostly involved in reading the flight planning proposals, since I have some experience in doing this with TexAQS 2006, DISCOVER-AQ 2013, and the San Antonio Field Study 2017. I attended the panel discussions from September 18-21. NASA paid for my travel expenses.
- At the NASA panel, I spoke at length with Jessica Gilman, a chemist at NOAA who has collected VOC canister data in Texas during TexAQS 2006 and SONGNEX. She told me about new chromatography software that NOAA is now using that has made a major improvement in how fast and how thoroughly she can analyze her data. She sent me additional information about the software package, and I forwarded it to Chris Owen, who will pass it along to the appropriate folks in the Monitoring Division.
- Worked on the literature review section of the new Houston conceptual model, which I am working on with Kasey Savanich and Dave Westenbarger. I have been reading (or re-reading) the relevant literature published since 2010 that deals with Houston air quality, and working to summarize the results in layperson-accessible text.
- I've been continuing to work with the ozone sonde launching project with Dave Westenbarger. We've been communicating with Gary Morris (St. Edwards) and Jimmy Flynn (UH) to decide when to launch ozone balloons. One issue we had to deal with this month was what to do on days with very light winds in both the upper and lower atmosphere. Although these days are ideal for ozone formation, we have been concerned about where the balloon payloads will come down if winds are very light. The balloon ascends until it bursts, which typically occurs at a height of >20 miles. On a day with very light winds, the payload could drop to the ground inside the urban area of Houston, e.g., inside Beltway 8. We have been trying to avoid this, for obvious reasons, but the light wind days are of the greatest interest. There are no laws prohibiting the landing of the payload within the urban area, but we have thought it to be a good policy. The compromise we worked out this month is to use the UH H-NET sites or nearby locations as launch sites for the balloons. These sites are located near the edges of urbanization in Houston; therefore, the payloads are more likely to fall outside the urban area. The balloon launching teams, coordinated by Gary Morris, have been launching this summer in San Antonio, Houston, Austin, and El Paso. We are only funding launches in San Antonio and Houston; other entities are funding other launches.
- I've been reviewing the AQRP reports for the San Antonio Field Study, from Aerodyne and Drexel University. I reviewed the draft reports, sent my comments to the UT project manager, and then reviewed the final reports. Since the projects were focused on data collection, at this time there are not many data analysis results to report. Data analysis projects will be critical to getting the most benefit to the agency from the massive data collection that has been completed.
- Barry Lefer at NASA contacted me to discuss the possibility of a joint NOAA/NASA flight over Houston and Beaumont a few days after Hurricane Harvey dissipated. I spoke with him and with Tom Ryerson at NOAA to give them some information about which areas



would be best to fly over. Their aircraft needed to do a test flight in preparation for a pole-to-pole field campaign that would take place later this year. The aircraft had a few instruments already installed, and it would have been able to measure some HRVOCs and a few other basic air quality parameters. I told them which areas were impacted by flooding the most, including the Mont Belvieu/Cedar Bayou area, and the Beaumont/Port Arthur area. They put together a rough flight plan, which to simply do some back-and-forth transects across SE Texas over about three hours, and then to return to Colorado. Unfortunately, the flight was scrapped for reasons unrelated to science.

- I listened in on the WESTAR webinar, and heard an excellent presentation by Barron Henderson. He discussed the difficulties in estimating the impact of international emissions upon air quality in the continental U.S. I tracked down some of the papers he had cited, and forwarded them to interested parties in AMDA.
- I was asked to do a literature search for studies that had examined the effects of hurricane approach, landfall, and aftermath upon air quality. I'm still in the process of researching it. In addition to the literature review, I am also planning to carry out a quick analysis of Texas and Louisiana hurricane landfalls to see how air quality is affected by the approach and departure of hurricanes.

halogen chemistry added  
GEOS-Chem & HEMAX

MEGAN calc offline, clim LNDX, long8mos spring,  
FINN non-US, global HTAP v2 2010 anthro EI  
2013 Canada, 2014 Mex, 2014 China  
US anthro 2014 NEI v.1

GEOSchem v11-01 1yr spring GEOS forward met  
Evaluations

baseline monitors - eg Mt Bachelor

O<sub>3</sub> sondes & profilers

satellite insitu's

aircraft data - routine, IAGOS limited data

OMI, TES, MOPITT

↳ profile ~~experimentation~~

basic consistency checks - time series 1yr  
magnitudes, seasonality

Houston  
&  
San Antonio

O<sub>3</sub> sonde → time series for selected hrs

Next Thursday NASA aircraft

any local Houston / Beaumont contacts

T. Ryerson 303-818-1672

B. Lefer

Enterprise Mt Belvieu