

2009 Innovations Awards Program APPLICATION

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ID # (assigned by CSG): 09-S-23TX

Please provide the following information, adding space as necessary:

State: Texas

Assign Program Category (applicant): Natural Resources – Env. Protection

1. Program Name: GFIR Innovation Evaluation
2. Administering Agency: Texas Commission on Environmental Quality
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9. Please provide a two-sentence description of the program.

The Texas Commission on Environmental Quality (TCEQ) has generated new air quality gains by using GasFind infrared (GFIR) and HAWK infrared cameras, an innovative technology that can remotely detect and visualize ozone precursor emissions of volatile organic compounds (VOC) from stationary sources. The camera is a key component in TCEQ's program to identify and respond on a case-by-case basis to emission sources, including sources that were not expected to have significant VOC emissions, and can assist in identifying the potential for source control and assessing existing controls.

10. How long has this program been operational (month and year)? Note: the program must be between 9 months and 5 years old on March 2, 2009 to be considered.
The program began in February 2005.

11. Why was the program created? What problem[s] or issue[s] was it designed to address?
The Texas Commission on Environmental Quality (TCEQ) created this program to find and address previously unrecognized VOC emissions sources.

12. Describe the specific activities and operations of the program in chronological order.

TCEQ took the following steps to implement this program:

- In February 2005, TCEQ used the HAWK camera for a field survey of industrial sites in the Milby Park area. During this two-week survey, TCEQ discovered significant hydrocarbon plumes from: sewers, valves, storage tanks, heat exchangers, and other sources.
- In July 2005, the TCEQ contracted ground and aerial HAWK observations of the Houston-Galveston-Brazoria and the Beaumont-Port Arthur areas. The HAWK

camera recorded significant hydrocarbon plumes from oilfield and landed storage tanks, marine loading operations, and barges.

- In response to the new data on emissions from storage tanks, TCEQ collected additional emissions fees, significantly revised emissions inventories, and revisited tank authorizations.
- As a result of this effort, five companies, totaling 14 sites, entered into voluntary agreements with the agency to reduce tank landing emissions.
- TCEQ has also initiated efforts with American Waterway Operators, Chemical Transportation Advisory Committee, and Louisiana Department of Environmental Quality to draft and issue "Recommendations for Best Management Practices to Control and Reduce Inadvertent Cargo Vapor Emissions in the Tank Barge Community."
- The TCEQ has recently adopted new rules to address the storage tank VOC emissions identified in this 2005 project.
- In September 2006, TCEQ developed consistent procedures for the use of the camera in regional investigation work, mobile monitoring work, and air quality assessment and planning.
- In July 2007, the TCEQ contracted aerial HAWK observations of the Gulf Coast and North Central Texas. The magnitude and the number of plumes in the Houston Ship Channel area had decreased since the July 2005 project.

Specific aspects of this program by each implementing office are described below.

The Field Operations Division uses the GFIR camera to:

- Assist in identifying potential sources of contaminants in response to ambient or other monitoring results that indicate elevated concentrations.
- Assist in identifying sites, or areas within a specific site, where a focused investigation may be conducted.
- Assist in identifying potential sources of complaints.
- Augment and bolster compliance investigations when a facility is required to control VOC emissions.

The Monitoring Operations Division uses the GFIR camera to:

- Assist in identifying potential sources when elevated VOC levels are detected with stationary monitors.
- Assist in identifying sampling locations (mobile or fixed). During mobile laboratory trips, the camera assists the team in identifying locations that may be impacted by emission sources. This allows us to properly place sampling vans and equipment.
- Assist in identifying possible safety concerns and minimize staff exposure. For example, during hurricane relief efforts, such as those after Hurricane Ike, it was used to identify leaking barrels and tanks to help in prioritizing relief efforts.
- Identify possible control or prevention options by sharing GFIR images with the relevant company.

The Chief Engineer's Office uses the GFIR camera to:

- Identify the potential for source control or to assist in an assessment of existing strategies.
- Screen potential sources for State Implementation Plan and rule considerations.
- Screen sources for emissions inventory issues.

- Coordinate with other TCEQ divisions as necessary.

13. Why is the program a new and creative approach or method?

The camera is a powerful, cutting edge infrared imagery device. This camera has the special ability to make emissions of hydrocarbon vapors visible and recordable. This capability is driving a paradigm shift within both the agency and the regulated community, since specific sources of previously unknown or underreported emissions that can impact local air quality are now made visible.

The use of the GFIR in investigation work has allowed the region to identify potential emission sources and target those sources for investigation, rather than relying on traditional methods. This has allowed the region to use its resources much more effectively, and recognize significant emissions reductions in the process.

The TCEQ has developed a unique side-by-side IR/visible light digital imagery system. This system creates compelling images of escaping vapor emissions from numerous source types in the IR spectrum, simultaneously displayed with standard video scenes showing no emissions and a clear sky.

14. What were the program's start-up costs? (Provide details about specific purchases for this program, staffing needs and other financial expenditures, as well as existing materials, technology and staff already in place.)

Expenses are approximately \$75,000 for the camera with a basic lens and \$25,000 for additional necessary lenses and computer and physical support systems. The cost of training, a necessary component for an effective imaging system, was \$15,000 for 12 staff.

15. What are the program's annual operational costs?

The cost of camera maintenance and upgrades is about \$25,000 annually. Over the years, TCEQ has expanded the number of cameras available in our regional offices, so there have been costs for camera purchases to expand the program. Approximately four FTEs (comprised of partial time commitments from 5 – 10 staff) are dedicated to GFIR-related activities across the agency.

16. How is the program funded?

Appropriations from the state legislature

17. Did this program require the passage of legislation, executive order or regulations? If YES, please indicate the citation number. No

18. What equipment, technology and software are used to operate and administer this program?
FLIR Thermacam GasFindIR

19. To the best of your knowledge, did this program originate in your state? If YES, please indicate the innovator's name, present address, telephone number and e-mail address.
Yes. Multiple staff from several offices were involved.

20. Are you aware of similar programs in other states? If YES, which ones and how does this program differ? No

21. Has the program been fully implemented? If NO, what actions remain to be taken?

The core program involving the camera's use for mobile monitoring, investigations, and air quality assessment has been implemented. TCEQ continues to explore options to further expedite emission reductions and air quality improvements via innovative technologies.

22. Briefly evaluate (pro and con) the program's effectiveness in addressing the defined problem[s] or issue[s]. Provide tangible examples.

The program includes direct interaction with the operators of emission sources, making them aware of the GFIR images as well as providing technical assistance on emission reduction strategies and regulatory requirements. The camera assists in identifying the exact operations resulting in emissions, thus expediting the ability to focus resources on appropriate controls or pollution prevention measures. The camera is used primarily as a screening tool, with follow-up analytic work (other sampling techniques such as stack or canister samples) appropriate to the type of operation.

As an example, there was a stationary ambient air monitor that was routinely registering high levels of benzene. Despite many attempts to locate the potential source of the benzene using previously available technology, the data were not sufficient to do so. Using the GFIR camera, a small upstream oil and gas facility less than a mile away was identified as having relevant emissions. Follow-up on-site testing revealed that the site emitted over 370 tons of benzene annually. Controls reduced the site's emissions to below 25 tons per year, and the stationary monitor no longer registers the high levels of benzene previously observed.

Another success story is the use of the HAWK camera, which is where a GFIR camera is mounted in a helicopter. Based on images obtained by the HAWK, TCEQ worked with several bulk fuel terminal operations in the Houston and Beaumont area to reduce the landing of floating roofs on storage tanks. The agreements with the companies provide for the reduction of over 7,000 tons of volatile organic compound (VOC) emissions.

The discovery of emission plumes in oilfields via GFIR has led to new rules, guidance, and research, including creation of an emission factor for VOCs per barrel of petroleum produced. Based on GFIR data, TCEQ has developed improved guidance for calculating VOC emissions from oilfield storage tanks (for use with emissions inventory and permits) and implemented new rules based on the revised emission estimates.

Many companies now own and operate GFIR cameras. As a result, emissions to the atmosphere are reduced, valuable hydrocarbon products are saved, and safety is improved.

The essential benefit of this program is the ability to focus resources where they result in the greatest emission reduction. Using GFIR to identify emission sources for more intensive review allows TCEQ to extend limited resources and maximizes the regulated entities' investment in emission control or pollution prevention.

Cons of this program are discussed under question 24.

23. How has the program grown and/or changed since its inception?

The program has grown to include cameras used by investigators and mobile monitoring staff throughout the state. Investigators are also using the camera at facilities prior to inspections in an effort to focus their investigations on recognized problems. This practice enhances the efficiency of the investigation process. Regulated entities have also

purchased cameras as leak detection and repair tools. The program has also been instrumental in changing the philosophy of industry and the agency in determining emission factors of various devices and proper operation of control devices. Many companies have seen the financial benefit of good leak detection and repair programs which in the long term assist in pollution prevention.

24. What limitations or obstacles might other states expect to encounter if they attempt to adopt this program?

The cost of the purchasing or renting the equipment, contracting for flight time in the case of the HAWK, and the training is very high. It is also important that the cameras are properly operated to view emissions. This technology is a qualitative tool and can't quantify the amount of emissions, thus limiting its ability to serve as the sole basis for compliance determinations.

2009 Innovations Awards Program - Program Categories and Subcategories

Use these as guidelines to determine the appropriate *Program Category* for your state's submission and list that program category on page one of this application. Choose only one.

Infrastructure and Economic Development

- Business/Commerce
- Economic Development
- Transportation

Government Operations

- Administration
- Elections
- Public Information
- Revenue

Health & Human Services

- Aging
- Children & Families
- Health Services
- Housing
- Human Services

Human Resources/Education

- Education
- Labor
- Management

- Personnel
- Training and Development
- Workforce Development

Natural Resources

- Agriculture
- Energy
- Environment
- Environmental Protection
- Natural Resources
- Parks & Recreation
- Water Resources

Public Safety/Corrections

- Corrections
- Courts
- Criminal Justice
- Drugs
- Emergency Management
- Public Safety

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This application is also available at www.csg.org, in the Programs section.