



Epi Update



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Evaluation of the Public Health Significance of Hydrogen Sulfide (H₂S) in Ambient Air near a Landfill in Bellview, Escambia County, Florida

Anita Lewis, M.P.H.

Background

Saufley Field Landfill is located in the Bellview community of Escambia County in Florida and was issued a permit for operation in 1990 as a construction and demolition landfill (C&D) by the Florida Department of Environmental Protection (FDEP).^[1] The original five acre landfill has operated continuously since 1990 and has grown to its present size of 23 acres due to large volumes of construction and demolition debris generated by the 2004 and 2005 Panhandle area hurricanes, including Ivan, Dennis, and Katrina. As a result, the landfill accepted enormous amounts of waste that included large quantities of drywall/sheetrock. As the waste decomposes, landfill-related odors, gases, inhaled particulate matter (PM) and fires can occur if appropriate engineering controls are not put into place.^[2,3] Decomposing drywall is of particular concern because of its breakdown by-product, hydrogen sulfide gas (H₂S), which has a characteristic "rotten egg" smell.^[2,4,5,6] Exposures to inhaled PM, odors, and gases emitted from a landfill may affect the health and safety of surrounding residents.^[2,5] In addition, surface and sub-surface fires as well as unrestricted community access pose a physical health hazard.

Introduction

A fire started in the landfill's debris pile in November 2005 and burned until mid-February 2006. During this time, the Escambia County Health Department (ECHD) received numerous complaints from residents that smoke and the smells of rotten eggs and natural gas had penetrated their homes and were causing respiratory problems, mucous membrane irritation, headaches, and nausea.

As a result of these concerns, the ECHD partnered with the United States Environmental Protection Agency (EPA) Emergency Response Team in January 2006 to monitor the air and collect air samples at 25 locations surrounding the landfill and at two locations inside the fence-line for a period of two days. However, the Florida Department of Health (FDOH) found the air-monitoring data insufficient to determine if there was a public health threat to residents living near Sauflay Field Landfill.

The ECHD continued to receive numerous health complaints throughout the spring of 2006 from residents near the landfill. In response, the ECHD and FDOH requested technical assistance from the Agency for Toxic Substances and Disease Registry (ATSDR) followed by a subsequent request for epidemiology aid from the Centers for Disease Control and Prevention (CDC). Collaborations were initiated in July 2006 to investigate if H₂S gas emissions from the landfill were causing adverse health effects such as eye irritation, headache, respiratory illness, and nausea.

The investigation collected self-reported information about diseases and health symptoms from community members residing near the landfill to determine if there was a relationship between health effects and H₂S exposures in the air. This report provides a summary of the key findings of the investigation.

Methods

The methodology and survey instruments used in this investigation are similar to the approach ATSDR used for a health investigation in a community surrounding a C&D landfill in Warren, Ohio.^[7] ATSDR installed air monitors, trained ECHD staff, and provided technical assistance throughout the investigation. ATSDR and FDOH evaluated the air sampling results to determine if H₂S levels posed a public health hazard.

In the fall of 2006, ECHD, with the assistance of ATSDR, recruited adult volunteers from the general community via public meetings and public service announcements in print media to be a part of the investigation and allow H₂S-monitor placement on their property. To be eligible to participate, volunteers had to: 1) be ≥18 years of age; 2) live or work within one mile of the landfill; and 3) give written consent.

In this investigation, four Zellweger Analytics Single-Point-Air Monitors (SPM) equipped with the ChemKey® and Chemcassett® (specific for H₂S) were placed at four residential locations surrounding Saufley Field Landfill for a period of eight weeks beginning November 3, 2006 and ending January 2, 2007. Study participants' distance from the nearest air monitor ranged from 25 feet to approximately one mile in distance. ECHD recorded the results from each monitor daily during this time period. Monitors provided continuous real-time H₂S readings at five minute intervals and were compiled into four summary measures: the average and maximum 24-hour average over all four meters; and the average and maximum 15-minute maximum (average) over all four meters. A random subset of those study participants who volunteered were asked to wear Chrom Air personal H₂S-monitors to capture personal exposure to H₂S gas emission.

Study participants completed an initial survey that captured date of birth, gender, residential history, respiratory and cardiac health conditions, and smoking history. Each participant was asked to complete daily diaries for the previous 24 hours to capture information including 18 self-reported health symptoms, the detection of eight specified odors, time spent in the area, and time spent outdoors in the area. Reported symptoms were categorized into five categories (Table1).

Table 1. Daily Diary Symptom Categories

Category	Symptoms
Gastrointestinal	diarrhea, nausea, vomiting
Ocular	red/irritated eyes
Respiratory	Upper -coughing, runny or stuffy nose, sore throat, head cold
	Lower -short of breath, wheezing
CNS	confusion, dizziness, memory problems, moody, irritable, headache, tightness in the chest
General Malaise	loss of appetite, tired, or fatigued

The EPA Region IV conducted separate residential ambient air-monitoring in four residential locations for fine PM (particles 2.5 micrometers in diameter and smaller) beginning on November 11, 2006 and ending on February 28, 2007. The data was collected and monitored by FDEP.

Statistical Methods

Descriptive statistics were performed on participant, exposure, and covariate data. Covariates included age measured in years (≤ 50 , > 50), gender, smoking status (never, former, current), existing breathing problem (none, acute, chronic), time in the area, and time spent outdoors in the area. Simple correlation analysis was used to show a relationship between the percent daily reporting of symptom categories and exposure variables.

Repeated measures analysis was conducted to account for the fact that multiple daily diary records for a given study participant have some degree of correlation. Specifically, generalized estimating equations (GEE) methodology was used to investigate the association between the symptom categories (Table 1) and H₂S-air monitor readings and odors (rotten eggs, burning smoke, cat urine, garbage, sewage, and cigarette smoke), while adjusting for covariates. GEE was also used to investigate the association between H₂S-air monitor readings and each reported odor (zero=no, 1=yes).

Results

Daily diaries were completed by 111 residents living within a one-mile radius of Saufley Field Landfill. On average, participants completed diaries for 34 days, ranging from three to 44 days. For analysis, diary records were excluded for days the participant reported not being in the area for an entire 24-hour period or outside in the area at all. A few participants were also excluded when the responses were incomplete or had all answers marked as yes. The final analysis was based on 2968 daily diary records on 100 participants for varying periods with 38 diaries completed on an average day.

The H₂S daily maximum 15 minute average, calculated by averaging the 15 minute maximum of each monitor over a 24-hour period, was used as the primary exposure variable. For the 44 days included in the analysis, daily maximum 15 minute average H₂S levels ranged from 0 to 132 parts per billion (ppb) with a median level of 25 ppb; most frequent H₂S level was 1 ppb. Of the 808 personal badge readings for 36 participants, 11 positive H₂S levels were recorded (six readings were ≈ 1 ppb, with the remaining five levels being 17, 40, 66, 83, and 123 ppb).

Repeated measures analysis indicated that increased H₂S levels (determined by the air-monitors) were not statistically associated with any of the symptom groupings. Increased H₂S levels (determined by the air-monitors) were found to be statistically associated with detection of the odors of burning smoke, rotten eggs, garbage, and sewage ($p < 0.05$). Increased time spent outdoors in the area was associated with an increase in reported upper respiratory symptoms. Persons with breathing problems reported at the study onset were more likely to report lower respiratory symptoms or general malaise, but there was no indication that these persons were more sensitive to adverse health effects due to increased H₂S levels.

Personal badges had 11 (1.3%) positive readings, and only five of these readings were above a true detection limit. Therefore, these results were not used in any analyses.

Ambient PM concentrations around Saufley Field Landfill did not exceed EPA's 24-hour standard of 35 $\mu\text{g}/\text{m}^3$ and were generally lower than EPA's annual standard of 15 $\mu\text{g}/\text{m}^3$.^[8] These PM concentrations also were similar to levels at another PM-monitoring station about seven miles to the northeast of the landfill. Therefore, the levels of airborne particulates measured around the landfill for this period may be indicative of regional air quality.

Conclusions and Limitations

A positive association was found between odors that are characteristic of smoke and H₂S releases and symptom groupings. A positive association was found between H₂S levels (as determined by the air monitors) and odors. However, an association was not found between H₂S levels (as determined by the air-monitors) and symptom categories in this analysis.

Area H₂S-monitor readings, as opposed to personal H₂S readings, from four different residential areas were used for analysis. Because of the varying distances from residents to monitors and to the landfill, and because of the periodic nature of H₂S releases, area monitoring results may not be the best surrogate for individual exposures.

It is important to note that the landfill owners were forced to cease normal operations during the study period. It is possible that measured H₂S levels were below levels present during normal operation.

The landfill has been closed to any new material transfers and was given until April 2008 to comply with FDEP closure regulations. FDOH and ATSDR classify the levels of H₂S in residential air around Saufley Field Landfill as a public health hazard.

Special thanks to the collaborators at ATSDR: Lynn Wilder, M.S.H., C.I.H.; Vince Seaman, Presidential Management Fellow; Teresa Ann Morrison, M.D., M.P.H., CDC EIS, Wendy Wattigney, M. Stat.

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). Health Consultation: Evaluation of Ambient Air Sampling, Saufley Field Landfill Bellview, Escambia County, Florida, 2006.
2. Agency for Toxic Substances and Disease Registry (ATSDR). 2004. [Toxicological profile for hydrogen sulfide](#) Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.
3. United States Environmental Protection Agency. Construction and Demolition Waste Landfills. Accessed at: <http://www.epa.gov/epaoswer/hazwaste/sqg/const/cdrpt.pdf>. [Accessed 2006 June 26].
4. Gypsum Association. (1992). Treatment and Disposal of Gypsum Board Waste: Industry Position Paper. Construction Dimensions, 5-6, 29-30.
5. State University System of Florida, Florida Center for Solid and Hazardous Waste Management. Gypsum drywall impact on odor production at landfills: Science and control strategies. December 2000 [updated 2002 January] Report #00-09.
6. Yang K, Xu Q, Townsend T, Chadik P, Bitton G, Booth M. Hydrogen Sulfide Generation in Simulated Construction and Demolition Debris Landfills: Impact of Waste Composition. *Journal of the Air and Waste Management Association* (1995) [serial on the internet]. 2006;56(8):1130-1138. Available from: Academic Search Premier, Ipswich, MA. [Accessed 2006 August 16].
7. Agency for Toxic Substances and Disease Registry (ATSDR). Health Consultation: Hydrogen Sulfide Exposure, Warren Township, Trumbull County, Ohio; September 12, 2002.
8. United States Environmental Protection Agency. Fine particle air monitoring standards and fine particulate health effects. Accessed at: <http://www.epa.gov/pmdesignations/faq.htm#>. [Accessed 2008 February 21].

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Florida Year-to-Date Mosquito-Borne Disease Through April 18, 2008

Rebecca Shultz, M.P.H., Caroline Collins, Danielle Stanek, D.V.M., Carina Blackmore, D.V.M., Ph.D.

During the period from January 1 to April 18, 2008, the following arboviral activity was recorded in Florida: Eastern equine encephalitis virus (EEEV), West Nile virus (WNV), St. Louis encephalitis virus (SLEV), Highlands J virus (HJV), and California encephalitis group viruses (CEV).

EEEV Activity: Positive samples from 12 horses, 17 sentinel chickens, and 14 live wild birds were received from 15 counties. EEEV was cultured from a pool of 50 *Culex salinarius* and a pool of 50 *Cx. nigripalpus*, both collected on February 13 in Volusia County and a pool of 50 *Culiseta melanura* collected on March 19 in Flagler County.

WNV/SLEV Activity: Positive samples of WNV antibody from two sentinel chickens were received from Putnam and Walton counties. Flavivirus-reactive samples from two live wild birds were received from Hillsborough and Santa Rosa counties. It was not determined whether the wild bird samples were reactive specifically to SLEV or WNV.

HJV Activity: Positive samples from five sentinel chickens were received from three counties. HJV was isolated from two pools of 50 *Culex nigripalpus* collected on February 22 and March 28 in Volusia County and one pool of *Cs. melanura* collected on March 19 in Flagler County.

CEV Activity: None.

Dead Bird Reports

The Fish and Wildlife Conservation Commission (FWC) collects reports of dead birds, which can be an indication of arbovirus circulation in an area. Since January 1, 196 reports representing a total of 524 dead birds (6 crows, 16 jays, 22 raptors, and 480 others) were received from 46 of Florida's 67 counties. Please note that the FWC collects reports of birds that have died from a variety of causes, not only arboviruses. Dead birds should be reported to www.myfwc.com/bird/.

See the following web site for more information:

<http://www.doh.state.fl.us/environment/community/arboviral/index.html>. The Department of Health Disease Outbreak Information Hotline offers recorded updates on the latest medical alerts issued and surveillance information at 888.880.5782.

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Florida Influenza Surveillance Report

Kate Goodin, M.P.H., Kateesha McConnell, M.P.H.

Influenza surveillance in Florida consists of six surveillance components: 1) Florida Sentinel Physician Influenza Surveillance Network (FSPISN); 2) Florida Pneumonia and Influenza Mortality Surveillance System; 3) State laboratory viral surveillance; 4) County influenza activity levels; 5) Notifiable Disease Reports; and 6) Influenza or influenza-like illness (ILI) outbreaks.

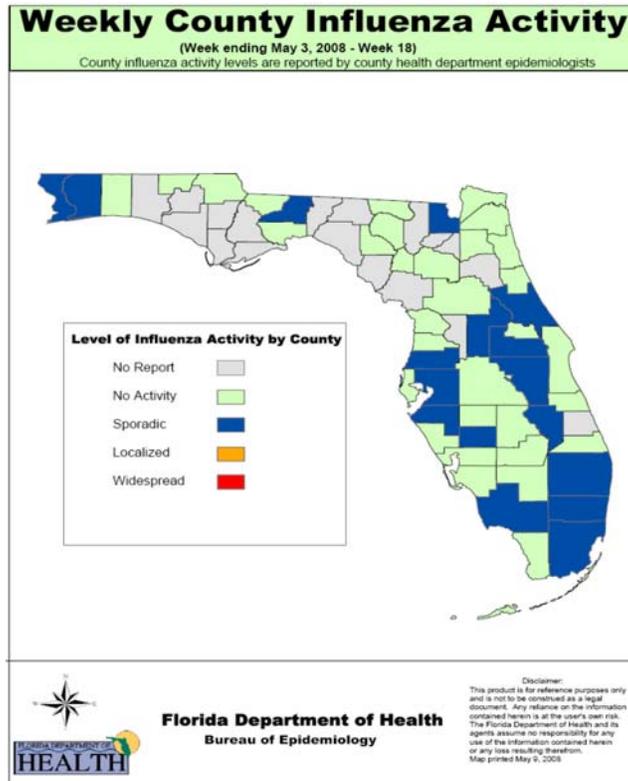
During reporting weeks 15 through 18, statewide influenza activity was localized, on average, according to the CDC influenza activity criteria. The proportion of patient visits for ILI as reported by the FSPISN averaged 0.76% for these four weeks, and this is below the state threshold for moderate activity of 1.75%. An influenza outbreak was reported at a female correctional institution (CI) in Miami-Dade County and five positive samples were identified as Influenza A. A nursing home in Escambia County reported an influenza outbreak in which 46 out of 100 residents reported ILI and five samples tested positive for Influenza B. There was an influenza-associated death reported in a 42 year old from the central east region. Samples were sent to the Tampa Lab and were positive for Influenza B. Since September 30, 2007, Florida Department of Health Laboratories have tested a total of 784 specimens for influenza viruses and 440 (56%) were positive. Among the 440 influenza

viruses, 369 (84%) were influenza A viruses and 71 (16%) were influenza B viruses. During week 18 only, no counties reported widespread or localized activity. Seventeen counties reported sporadic activity. Thirty counties reported no activity. Nineteen counties did not report.

The full report for each report week will also be available on EpiCom and on the Bureau of Epidemiology website: http://www.doh.state.fl.us/disease_ctrl/epi/htopics/flu/reports.htm.

There are only two more report weeks for the 2007-2008 influenza season. The last report will be published for Week 20.

Please encourage all sentinel physicians to continue to submit samples for testing to the state lab.



Kateesha McConnell is the Florida Epidemic Intelligence Service Fellow with the Volusia County Health Department. She can be contacted at 386.274.0642, or by e-mail at Kateesha_McConnell@doh.state.fl.us. Kate Goodin is a surveillance epidemiologist with the Bureau of Epidemiology, Florida Department of Health. She can be contacted at 850.245.4444 Ext. 2440 (office), 850.922.9299 (fax), or by email at Kate_Goodin@doh.state.fl.us

Just Published

Outbreaks of noroviral gastroenteritis in Florida, 2006-2007

T.J. Doyle, L. Stark, R. Hammond, and R.S. Hopkins

Epidemiology and Infection

Available online: <http://journals.cambridge.org/action/displayIssue?iid=197538>



Norovirus
I.pdf (140)

Upcoming Events



Mark your calendar for May 29-30, 2008 to attend the 13th Annual Epidemiology Statewide Seminar in Orlando sponsored by the Florida Department of Health, Bureau of Epidemiology.

Bureau of Epidemiology Monthly Grand Rounds

Date: Last Tuesday of each month

Time: 10 a.m.-11 a.m.

Location: Building 2585, Room 310A

Dial-In Number: 877.646.8762 (password: Grand Rounds)

Upcoming Topics:

May - No Grand Rounds scheduled

July - Unusual TB Investigations, presented by Catherine Kroll, M.P.H., EIS, and Sericea Smith, M.P.H., EIS



Florida Center for Public Health Preparedness

Summer 2008 Field Epidemiology training programs

Continuing Education Credits available for all courses

FDOH Tier 1 & Tier 2 Reviewed & Approved

IFIRST2	June 12	Region 5 - Stuart, FL-Martin County Health Department
IFIRST	June 23-24	Region 2 - Madison, FL-UF Agriculture Center
FIRST	July 9	Region 4 - Bartow, FL
IFIRST2	July 25	Region 7 - Miami, FL
FIRST	July 28	Region 6 - Naples, FL-Collier County Health Department

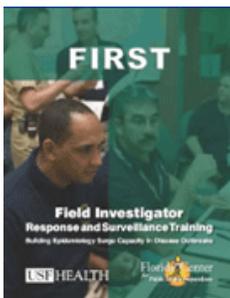
• [Register Today](#) •

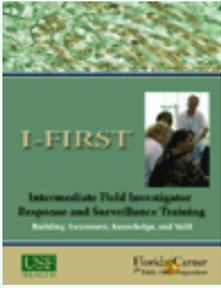
FIRST - Field Response & Surveillance Training

Onsite course - 8 hours

8:00am to 5:00pm

This course was developed to help public health staff who may be called upon to assist epidemiology staff during a surge-capacity event. It is designed to help public health workers develop the abilities needed to assist in epidemiology investigations at times when staff capacity is overburdened. [->MORE](#)





IFIRST - Intermediate Field Response & Surveillance Training

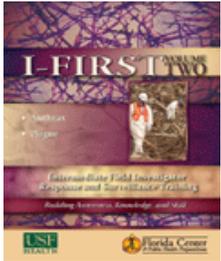
Onsite course - 16 hours (2-day program)

8:00am to 5:00pm

This two day program is designed to develop the knowledge, skills, and abilities for disease investigations associated with Gastrointestinal Illness (GI Illness) and Avian Influenza. [>>MORE](#)

There is 1.3 hours of online pre-work:

- GI Illness
- Avian Influenza



IFIRST2 - Intermediate Field Response & Surveillance Training 2

Onsite course - 8 hours

8:00am to 5:00pm

This program is designed to develop the knowledge, skills, and abilities for disease investigations associated with Anthrax and Plague. Public health workers and their community partners, who may be deployed on Field Epidemiology Strike Teams, will be better equipped to assist local, regional, state, and national epidemiology staff in Anthrax and Plague investigations during surge capacity. [>>MORE](#)

There is 2.5 hours of online pre-work:

- Anthrax
- Plague



Basic Epidemiology - Basic Epidemiology

Online course - 4 hours

This online program is designed to develop the awareness and knowledge of public health workers who may be deployed on Field Epidemiology strike teams in order to assist local, regional, state, and national epidemiology staff in disease investigations during surge capacity.

There are 7 online modules (4 hours total time to complete course):

- Basic Epidemiology Overview
- Field Questionnaire Methodology
- Surveillance: Post-event Strategies
- Sampling & Packaging
- Quarantine & Isolation
- Basic Interview Techniques
- Epidemiological Contact Investigation

Learn more about FCPHP's programs:
<http://www.fcphp.usf.edu>

View the course schedule FCPHP training programs:
<http://www.fcphp.usf.edu/courses/search/search.asp>



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Reportable Diseases in Florida

Up-to-date information about the occurrence of reportable diseases in Florida, based on the Merlin surveillance information system, is available at the following site: <http://www.floridacharts.com/merlin/fregrpt.asp>. Counts can be displayed by disease, diagnosis status, county, age group, gender, or time period.

This Month on EpiCom

Christie Luce



EpiCom is located within the Florida Department of Health's Emergency Notification System (FDENS). The Bureau of Epidemiology encourages *Epi Update* readers not only to register on the EpiCom system by emailing the Florida Department of Health Emergency Notification System Helpdesk at FDENS-help@doh.state.fl.us, but to sign up for features such as automatic notification of certain events. Users are invited to contribute appropriate public health observations related to any suspicious or unusual

occurrences or circumstances through the system. EpiCom is the primary method of communication between the Bureau of Epidemiology and other state medical agencies during emergency situations. Following are selected recent postings:

- GI illness outbreak at a skilled nursing facility, Clay County
- *Vibrio vulnificus* death, Pasco County
- Pet-associated campylobacteriosis, Hillsborough County
- Varicella outbreak in an elementary school, Escambia County
- Possible GI associated with a swim team, Broward County
- *Klebsiella pneumoniae* carbapenemase (KPC) producing organisms cluster, Broward County
- Foodborne outbreak linked to a restaurant, Orange County
- Suspect infant botulism case, Duval County
- Outbreak investigation in a DOC correctional facility, Volusia County
- ILL outbreak at a nursing home, Escambia County
- Investigation of salmonella in a nursing home, Miami-Dade County
- Fatal meningococcal disease case, Sarasota County
- *Neisseria meningitidis*, Hillsborough/Polk counties
- Foodborne outbreak investigation at a local hospital, Pinellas County
- Lead Paint Standard violations and recalls online:

http://www.doh.state.fl.us/environment/community/lead/The_Lead_Alert_Network.htm.

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