Letter Health Consultation

COYOTE-NAVARRE CONSTRUCTION AND
DEMOLITION DEBRIS LANDFILL

NAVARRE, SANTA ROSA COUNTY, FLORIDA

Prepared by the
Florida Department of Health

MAY 15, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

COYOTE-NAVARRE CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

NAVARRE, SANTA ROSA COUNTY, FLORIDA

Prepared By:

Florida Department of Health
Division of Environmental Health
Under Cooperative Agreement with
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

May 13, 2009

Mr. Michael S. Kennedy, PG
Program Administrator, Waste Management Program
Florida Department of Environmental Protection
Northwest District Office
160 Governmental Center
Pensacola, Florida 32502-5794

Re: Hydrogen Sulfide in Ambient Air near the Coyote-Navarre Construction and Demolition Debris Landfill: November 2007 – February 2008

Dear Mr. Kennedy:

The Florida Department of Health (DOH) evaluates the public health threat around hazardous waste sites through a cooperative agreement with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). As you requested, Florida DOH reviewed concentrations of hydrogen sulfide measured by the U.S. Environmental Protection Agency (EPA) around the active Coyote-Navarre Construction and Demolition (C&D) Debris Landfill November/December 2007 and January/February 2008. This letter addresses the potential for hydrogen sulfide to affect the health of nearby residents. It expands on our February 4 and June 30, 2008 letters to you [FDOH 2008a and FDOH 2008b].

Background and Statement of Issues

The 37-acre Coyote-Navarre C&D Landfill (Coyote) is at 3201 Five Forks Road between Holley and Navarre in Santa Rosa County, Florida (Figure 1).

Construction and demolition (C&D) debris includes concrete, asphalt, wood, metal, drywall (also known as wallboard or sheet rock) and roofing material from the construction, renovation or demolition of structures. Coyote Landfill received a particularly large volume of C&D debris following hurricanes in 2004 and 2005. The debris included water-damaged drywall from homes and businesses. Decomposing drywall and other wastes generate odors and gases. Anaerobic bacteria convert the sulfate in drywall into hydrogen sulfide gas. Hydrogen sulfide gas has a characteristic “rotten egg” or sewer gas smell. Landfill decomposition also produces heat, which can ignite hydrogen sulfide and other gases resulting in surface and sub-surface fires. In June 2000 and October/November 2005, fires burned at Coyote [ATSDR 2008].

Nearby residents attribute numerous health concerns to smoke and odors from the Coyote Landfill. In fall 2005, they complained to the Santa Rosa County Health Department (CHD) about respiratory problems, headaches, nausea, and eye/nose/throat irritation. In July and August 2006, the Santa Rosa CHD surveyed residents within 2 miles of Coyote Landfill using the Protocol for Assessing Community Excellence in Environmental Health (PACE-EH). Residents reported fatigue/restlessness, upset stomach, and dizziness in addition to symptoms reported in 2005. In response to an October 2007 Florida DOH mail-out, nearby residents added skin problems, kidney failure, heart problems, and childhood health/development.

In a previous report, Florida DOH evaluated hydrogen sulfide concentrations measured by the Santa Rosa CHD south of the landfill for the time period of January through March 2007, and classified the air a "public health hazard." These measured concentrations could have adversely affected children with respiratory-diseases and could have caused eye irritation, nasal irritation, cough, breathlessness/ wheezing, and headaches in children and adults. Although particulates from the landfill fires were not measured, smoke could have aggravated symptoms in people with respiratory conditions [ATSDR 2008]. The following discussion considers subsequent hydrogen sulfide testing by the U.S. EPA for the time period of November 2007 through February 2008.

Discussion

From November 21 to December 21, 2007 and from January 14 to February 13, 2008, the U.S. EPA detected hydrogen sulfide at nine monitoring stations around the Coyote Landfill (Figures 2 and 3). They observed the highest concentrations of hydrogen sulfide late in the evening and early in the morning when the air is still. This is a typical pattern for a contaminant that is heavier than air, when atmospheric inversion conditions are present in the evening and early morning.

Florida DOH compared the hydrogen sulfide concentrations EPA measured with ATSDR Minimum Risk Levels (MRLs). MRLs are contaminant concentrations at which exposures are unlikely to cause non-cancer health effects over a specified duration of exposure. They include ample safety factors to ensure sensitive populations are protected. Levels less than the MRL are unlikely to cause illness. Levels equal to or greater than the MRL warrant further evaluation. Because of the safety factors included in an MRL, exposure to concentrations higher than the MRL does not necessarily result in health effects.

The ATSDR MRL for an intermediate length (14 – 364 days) exposure to hydrogen sulfide is 20 parts per billion (ppb). This is based on a no observed adverse effect level (NOAEL) in an animal study that found a loss of nerves within and increases in the number of cells lining the nasal cavity after a 10-week exposure to hydrogen sulfide [ATSDR 2006]. Levels of hydrogen sulfide at almost all monitors around the Coyote Landfill detected concentrations at or higher than 20 ppb (Tables 1 and 2).

The ATSDR MRL for an acute length of exposure (less than 14 days) to hydrogen sulfide is 70 ppb. This is based on a lowest observed adverse effect level (LOAEL) in a human study where 2 out of 10 asthmatics exposed to 2,000 ppb for 30 minutes experienced changes in airway resistance and specific airway conductance [ATSDR 2006]. Monitoring stations located south (AM#1, AM#5, and AM#9) and southeast (AM#7) of the landfill detected concentrations at or higher than 70 ppb (Tables 1 and 2).

As a public health guideline, the Florida DOH recommends the 30-minute average hydrogen sulfide air concentration not exceed 100 parts per billion (ppb) [FDOH 2008a, 2008b] (Attachments A&B). Florida DOH found peak concentrations of hydrogen sulfide above 100 ppb are associated with eye irritation. Also concentrations of hydrogen sulfide above 30 ppb for 30 minutes are associated with increased hospital visits for children experiencing respiratory problems [ATSDR 2006]. On at least 24 occasions between November 21, 2007 and February 12, 2008, the 30-minute average hydrogen sulfide concentrations around the Coyote Landfill were greater than 100 ppb (Tables 5 and 6).

The air quality data evaluated for this report have limitations. They reflect only a two-month period at nine locations around the landfill. The results cannot be used to determine "worst-case" exposures, the frequency of worst-case exposures, or be considered representative of "typical" ambient air hydrogen sulfide concentrations.

In mid 2008, the responsible party covered a portion of the landfill with a clayey-sand. The cover appears to have greatly reduced resident complaints of both illness and odor. No additional sampling is planned at this time.

Conclusions

Between November 2007 and February 2008, the levels of hydrogen sulfide in the air around the Coyote-Navarre C&D Landfill were a public health hazard. On at least 24 occasions between November 2007 and February 2008, the 30-minute average hydrogen sulfide concentrations around the Coyote Landfill were greater than 100 ppb. Peak concentrations of hydrogen sulfide above 100 ppb are associated with eye irritation. Also concentrations of hydrogen sulfide above 30 ppb for 30 minutes are associated with increased hospital visits for children experiencing respiratory problems. On at least 24 occasions between November 2007 and February 2008, the 30-minute average hydrogen sulfide concentrations around the Coyote Landfill were greater than 100 ppb.

Currently, Coyote-Navarre C&D Landfill is an indeterminate public health hazard. The responsible party has not verified post remediation hydrogen sulfide levels.

Recommendations

Implement effective remedial measures that reduce the concentrations of hydrogen sulfide in the air around Coyote-Navarre C&D Landfill. These measures should include comprehensive ambient air monitoring to ensure that levels of hydrogen sulfide concentrations around the landfill remain below health guidelines.

Nearby residents who feel ill, especially if their illness persists, should see a doctor. They should inform their doctors about potential environmental exposures.

Sincerely,

Randy Merchant, Environmental Administrator
Florida Department of Health
Bureau of Environmental Public Health Medicine
850 245-4299

Cc: Bill Sirmans – Santa Rosa CHD
Chris Russell – U.S. EPA, Region IV
Howard Jones – Holley Action Group

References

[ATSDR 2008] Agency for Toxic Substances and Disease Registry. Health Consultation: Hydrogen Sulfide in Ambient Air Coyote Construction and Demolition Debris Landfill, Holly-Navarre, Santa Rosa County, Florida. September 30, 2008.

[ATSDR 2006] Agency for the Toxic Substances and Disease Registry. Toxilogical Profile for Hydrogen Sulfide: U.S. Department of Health and Human Services, U.S. Public Health Service. July 2006.

[FDOH 2008a] Florida Department of Health. Letter to Department of Environmental Protection. February 4, 2008.

[FDOH 2008b] Florida Department of Health. Letter to Department of Environmental Protection. June 30, 2008.

CERTIFICATION

The Florida Department of Health, Division of Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began and completed editorial review.

Jennifer Freed
Technical Project Officer,
CAT, CAPEB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

Alan Yarbrough
Team Lead
CAT, CAPEB, DHAC, ATSDR

Figure 1. Location of Site in Santa Rosa County, Florida

FLORIDA DEPARTMENT OF HEALTH

DIVISION OF Environmental Health

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Figure 2. Monitoring Locations for Hydrogen Sulfide near Coyote Landfill from November 21, 2007 to December 21, 2007 [Source: Lockheed Martin 2008]

Figure 3. Monitoring Locations for Hydrogen Sulfide near Coyote Landfill from January 14, 2008 to February 13, 2008 [Source: Lockheed Martin 2008]

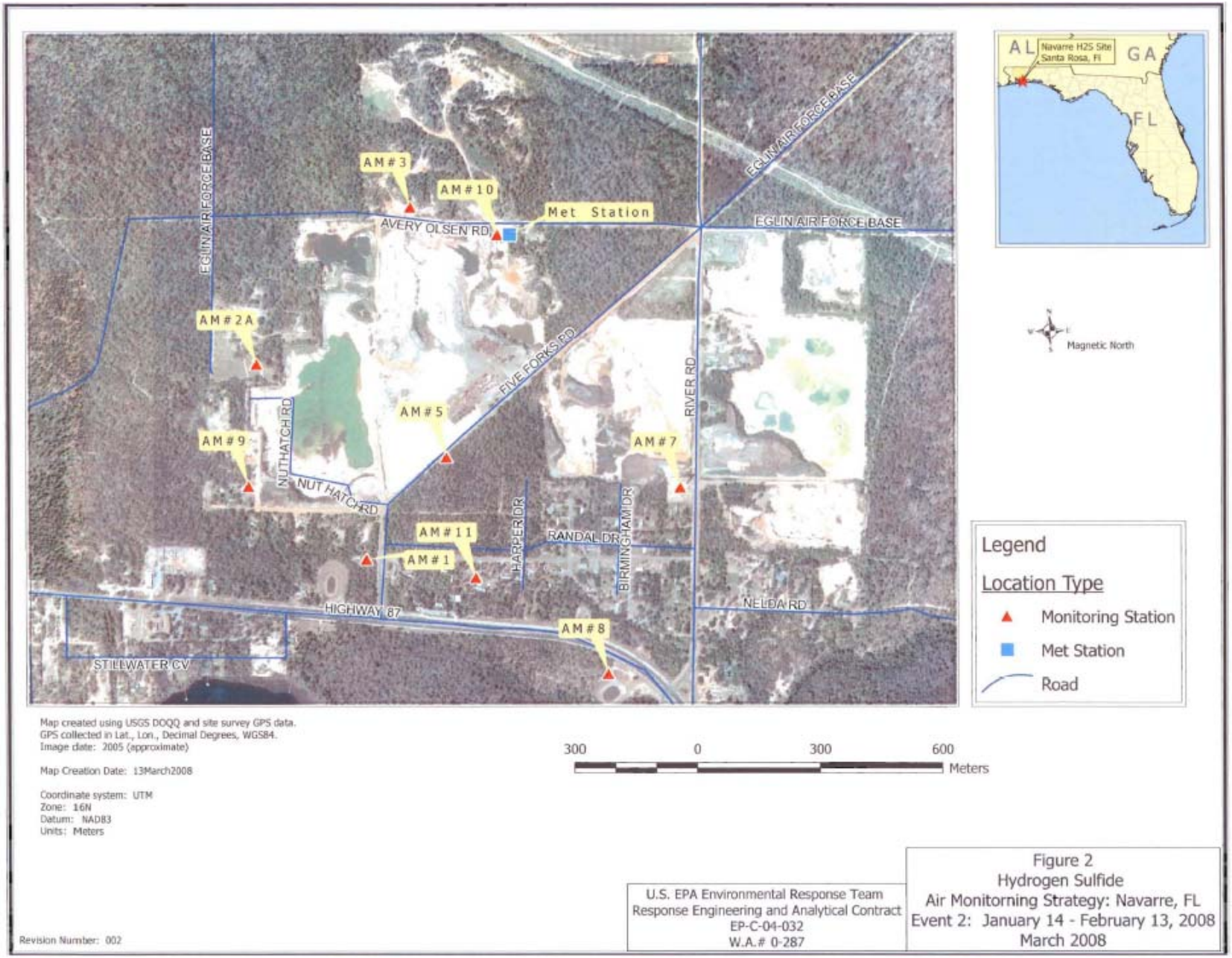

Table 1. Hydrogen Sulfide Air Concentrations November 21 to December 21, 2007*

Sample Location (Figure 2)	Total Number of Hours Tested	Number of Hours ≥ 20 ppb (Intermediate MRL)	Number of Hours ≥ 70 ppb (Acute MRL)
AM#1	564	25	2
AM#2	709	3	---
AM#3	710	---	---
AM#4	732	---	---
AM#5	644	25	7
AM#6	572	0.3	---
AM#7	688	2	---
AM#8	733	4	---
AM#9	733	12	0.3

* Hydrogen sulfide detection range for LOW sensitivity meter: 2 - 90 ppb
ppb= part of hydrogen sulfide per billion parts of air, by volume
MRL= ATSDR's Minimal Risk Level; an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure; an intermediate exposure interval is for more than 14 days and less than a year; an acute exposure interval is for up to 14 days

Table 2. Hydrogen Sulfide Air Concentrations January 14 to February 13, 2008*

Sample Location (Figure 3)	Total Number of Hours Tested	Number of Hours ≥ 20 ppb (Intermediate MRL***)	Number of Hours ≥ 70 ppb (Acute MRL***)
AM#1	691	48	9
AM#2	735	3	---
AM#3	732	3	---
AM#5	731	37	9
AM#7	715	1	0.3
AM#8	736	2	---
AM#9	735	7	---
AM#10	731	1	---
AM#11	735	3	---

*Hydrogen sulfide detection range for LOW sensitivity meter: 2 - 90 ppb
ppb= part of hydrogen sulfide per billion parts of air, by volume
MRL= ATSDR's Minimal Risk Level; an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure; an intermediate exposure interval is for more than 14 days and less than a year; an acute exposure interval is for up to 14 days

Table 3. Maximum and Maximum Daily Average Hydrogen Sulfide Air Concentrations November 21 to December 21, 2007*

Sample Location (Figure 2)	Max H_2S (ppb)	Max Daily Average H_2S (ppb)
AM#1	**164** (12/4)	**9** (12/17)
AM#2	**11** (11/27)	**3** (12/17)
AM#3	**121** (11/23)	**2** (11/23; 11/29; 12/8; 12/9; 12/10; 12/11; 12/12; 12/13; 12/14)
AM#4	**69** (12/17)	**63** (12/17)
AM#5***	**485** (12/21)	**37** (12/21)
AM#6	**7** (12/12)	**1** (12/12)
AM#7	**11** (11/21; 12/11; 12/12; 12/13; 12/14; 12/19)	**10** (12/13)
AM#8****	**8** (11/29; 11/30; 12/4; 12/9; 12/10; 12/12; 12/13; 12/21)	**2** (11/28; 11/29; 11/30; 12/1; 12/2; 12/4; 12/21)
AM#9	**143** (12/1)	**24** (12/17)

*Hydrogen sulfide detection range for MID sensitivity meter: 53 - 1,500 parts per billion
ppb = part of hydrogen sulfide per billion parts of air, by volume
***Only 5 hours of data collected on 12/21/2007
****Only 14 hours of data collected on 12/21/2007

Table 4. Maximum and Maximum Daily Average Hydrogen Sulfide Air Concentrations January 14 to February 13, 2008*

Sample Location (Figure 3)	Max H_2S (ppb)	Max Daily Average H_2S (ppb)
AM#1***	**176** (1/29)	**10** (1/28)
AM#2	**76** (1/29)	**4** (1/20)
AM#3	**105** (2/9)	**3** (2/10)
AM#5	**486** (1/27)	**13** (1/28)
AM#7	**73** (1/28)	**9** (2/4; 2/5; 2/6)
AM#8	**8** (2/9; 2/10)	**1** (2/10/)
AM#9	**123** (1/29)	**35** (1/21)
AM#10	**18** (1/21)	**12** (1/20; 1/21)
AM#11	**183** (1/15)	**9** (1/15)

*Hydrogen sulfide detection range for MID sensitivity meter: 53 - 1,500 parts per billion
**ppb = part of hydrogen sulfide per billion parts of air, by volume
***Only 14 hours of data collected on 1/28/2008

Table 5. 30-Minute Average Hydrogen Sulfide Air Concentrations Exceeding 100 ppb November 21 to December 21, 2007*

Sample Location (Figure 2)	Date	Time	30-Minute Average H_2S (ppb)
AM#1	12/4	21:31 - 22:01	102
AM#5	12/3	20:40 - 21:10	108
AM#5	12/4	3:13 - 3:43	133
AM#5	12/4	21:56 - 22:26	117
AM#5	12/5	4:11 - 4:41	166
AM#5	12/5	4:43 - 5:13	129
AM#5	12/5	5:15 - 5:45	125
AM#5	12/5	5:47 - 6:17	106
AM#5	12/16	22:35 - 23:05	103
AM#5	12/21	1:32 - 2:02	118
AM#5	12/21	4:25 - 4:55	190

*Hydrogen sulfide detection range: 53 - 1,500 parts per billion
ppb = part of hydrogen sulfide per billion parts of air, by volume
Source: FDOH 2008a

Table 6. 30-Minute Average Hydrogen Sulfide Air Concentrations Exceeding 100 ppb January 14 to February 13, 2008

Sample Location (Figure 3)	Date	Time	30-Minute Average H_2S (ppb)
AM#1	1/28	23:06 - 23:35	104
AM#1	1/28- /29	23:36 - 0:05	126
AM#1	1/29	0:06 - 0:35	152
AM#5	1/14-1/15	23:59 - 0:28	119
AM#5	1/21	17:15 - 17:44	120
AM#5	1/27	17:12 - 17:41	185
AM#5	1/27	20:05 - 20:34	127
AM#5	1/28	6:00 - 6:29	119
AM#5	1/28	6:44 - 7:13	157
AM#5	1/28	7:14 - 7:43	117
AM#5	2/8	2:17 - 2:46	165
AM#5	2/9	2:43 - 3:12	137
AM#11	1/15	7:18 - 7:47	139

*Hydrogen sulfide detection range: 53 - 1,500 parts per billion
ppb = part of hydrogen sulfide per billion parts of air, by volume
Source: FDOH 2008a

ATTACHMENT A: Letter to DEP (February 4, 2008)

FLORIDA DEPARTMENT OF HEALTH

Charlie Crist
Governor

Ana M. Viamonte Ros, M.D., M.P.H.
Secretary of Health

February 4, 2008

Mike Kennedy
Florida Department of Environmental Protection
Northwest District Office
Pensacola, Florida

Re: Hydrogen Sulfide Near Coyote Landfill

Dear Mr. Kennedy:

As a public health guideline, the Florida Department of Health recommends the 30 minute average hydrogen sulfide air concentration not exceed 100 parts per billion (ppb). Peak concentrations of hydrogen sulfide above 100 ppb are associated with eye irritation. Also concentrations of hydrogen sulfide above 100 ppb for 30 minutes are associated with increased hospital visits for children experiencing respiratory problems.

The breakdown of gypsum or drywall in landfills produces hydrogen sulfide gas. Hydrogen sulfide has a characteristic "rotten egg" or sewer gas smell. The hydrogen sulfide odor threshold for most people is about 1 to 10 ppb.

The Florida Department of Health has reviewed the levels of hydrogen sulfide measured by the US Environmental Protection Agency in the air around the Coyote landfill in Holley-Navarre. On at least five occasions in November and December 2007, the 30 minute average hydrogen sulfide concentration measured at the border of the Coyote landfill exceeded 100 ppb.

We recommend prompt action to reduce the concentration of hydrogen sulfide in the air around this landfill. If you have any questions about this recommendation, please contact Randy Merchant at SC 205-4249.

Sincerely,

Brian J. Hughes

Brian Hughes, Ph.D.
Office of Environmental and Occupational Toxicology
Division of Environmental Health

Cc: Bill Simmans – Santa Rosa CHD
Chris Russell - EPA

ATTACHMENT B: Letter to DEP (June 27, 2008)

FLORIDA DEPARTMENT OF HEALTH

Charlie Crist
Governor

Ana M. Viamonte Ros, M.D., M.P.H.
Secretary of Health

June 27, 2008

Mike Kennedy
Florida Department of Environmental Protection
Northwest District Office
Pensacola, Florida

Re: Hydrogen Sulfide Near Coyote Landfill; January/February 2008 Data

Dear Mr. Kennedy:

As a public health guideline, the Florida Department of Health recommends the 30 minute average hydrogen sulfide air concentration not exceed 100 parts per billion (ppb). Peak concentrations of hydrogen sulfide above 100 ppb are associated with eye irritation. Also concentrations of hydrogen sulfide above 100 ppb for 30 minutes are associated with increased hospital visits for children experiencing respiratory problems.

The breakdown of gypsum or drywall in landfills produces hydrogen sulfide gas. Hydrogen sulfide has a characteristic "rotten egg" or sewer gas smell. The hydrogen sulfide odor threshold for most people is about 1 to 10 ppb.

The Florida Department of Health has reviewed the levels of hydrogen sulfide measured by the US Environmental Protection Agency in the air around the Coyote landfill in Holley-Navarre during January and February 2008. On at least thirteen occasions, the 30 minute average hydrogen sulfide concentration measured at the border of the Coyote landfill exceeded 100 ppb.

We recommend prompt action to reduce the concentration of hydrogen sulfide in the air around this landfill. If you have any questions about this recommendation, please contact Randy Merchant at 850/245-4249.

Sincerely,

Brian Hughes, Ph.D.
Office of Environmental and Occupational Toxicology
Division of Environmental Health

Cc: Bill Simmans – Santa Rosa CHD
Chris Russell - EPA