# Letter Health Consultation

Evaluate Dow Chemical Air Samples

UNION CARBIDE
(a/k/a DOW CHEMICAL AIR SAMPLING)
ST. CHARLES PARISH, LOUISIANA

**Prepared by the**
**Louisiana Department of Health and Hospitals**

NOVEMBER 18, 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

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STATE OF LOUISIANA
DEPARTMENT OF HEALTH AND HOSPITALS

Bobby Jindal
GOVERNOR

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SECRETARY

September 28, 2009

Jeff Meyers
Administrator, Emergency and Radiological Services
Louisiana Department of Environmental Quality
P.O. Box 4314
Baton Rouge, LA 70821-4314

Dear Mr. Meyers:
The Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (DHH/OPH/SEET) has evaluated the Dow Chemical air samples collected by the Louisiana Department of Environmental Quality on July 6, July 8, July 9, and July 12, 2009, in St. Charles Parish, Louisiana. In addition, DHH/OPH/SEET has reviewed St. Charles Parish Hospital Emergency Department (ED) logs from July 7, 2009 to July 10, 2009. The following letter provides the results of SEET's assessment of the air sampling and emergency room visits conducted during those events.

**Event Description and History**

On July 7, 2009 at approximately 4:45 am a tank failure occurred at DOW Chemical in Taft, LA resulting in fugitive air releases of ethyl acrylate. At approximately 7:00 am on July 7th, the St. Charles Parish Emergency Operations Center (EOC) initiated emergency procedures forcing road closures and an evacuation of people immediately downwind of the DOW facility. A statement from Dow said a valve on the tank began to release fumes from the tank shortly before 5 a.m on July 7, 2009, "after the structural condition of the tank became an issue." The Louisiana Department of Environmental Quality (LDEQ) collected air samples from its permanent air monitor located in Hahnville, directly 2 miles east of the facility and with additional air monitoring to characterize the release. Residents living downwind from the plant reported eye, nose, and throat irritation and 44 individuals were treated at the St. Charles Parish Hospital.

**Ethyl Acrylate**

Ethyl acrylate is a volatile organic compound used in the manufacture of water-based paints, adhesives, plastics and many other products. It has a very strong acrid odor that can be detected at very low levels (100 to 500 ppb). Because of its strong smell, any rise in local concentration is immediately obvious. The health effects of ethyl acrylate are related to its irritant properties. Acute exposure may cause irritation of the eyes, nose, throat and other mucus membranes, with

tearing, runny nose and burning of the throat. The degree and length of irritation is related to the concentration in air inhaled and the duration of exposure. Headache and nausea may occur related to the strong odors(1).

### Environmental Data Collection

The Louisiana Department of Environmental Quality collected air samples to monitor the release of ethyl acrylate (See the map in Appendix A). LDEQ collected three 24 hour air samples from its fixed air monitor in Hahnville, Louisiana 2 miles east of the Dow facility on July 6, July 9, and July 12, 2009. In addition, LDEQ collected a 1 minute grab sample located 1 mile east of the facility at the intersection of Highway 18 and Champagne Street in Taft, Louisiana on July 8, 2009.

### Environmental Data Evaluation

All air samples were analyzed for volatile organic compounds, including ethyl acrylate, by the LDEQ Air Toxics Laboratory using the gas chromatograph separation with mass selective detector and the gas chromatograph separation with flame ionization detector. Ethyl acrylate is not part of the laboratories target analyte list, therefore, qualitative identification of ethyl acrylate was added. The detection limit for all compounds analyzed was 0.2 ppm or 200 ppb.

The Louisiana Toxic Air Pollutant Ambient Air Standards (LA AAS) assigns an eight hour average ambient air standard concentration of 476 parts per billion (ppb) for ethyl acrylate (1). The Occupational Safety and Health Administration (OSHA) permissible exposure limit for ethyl acrylate is 25 ppm of air as an 8-hour time-weighted average (TWA) concentration (1). The National Institute for Occupational Safety and Health (NIOSH) has established a recommended exposure limit (REL) for ethyl acrylate of 4 ppm as a TWA for up to a 10-hour workday and a 40-hour work week (1). The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned ethyl acrylate a threshold limit value of 5 ppm as a TWA for a normal 8-hour workday and a 40-hour workweek and a short-term exposure limit (STEL) of 15 ppm for periods not to exceed 15 minutes(1).

The Texas Commission of Environmental Quality has assigned ethyl acrylate a short term effects screening level (ESL) of 1.2 ppm or 1200 ppb. ESLs are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air. “Short-term” generally indicates a one-hour averaging period (2).

## Exposure Pathways

Since the ethyl acrylate was released into the air, ambient air is the transport medium and source of exposure for ethyl acrylate. The route of exposure to ethyl acrylate is through inhalation of air. The exposed population includes St. Charles Parish residents who reside downwind of the Dow facility.

Officials from St. Charles Parish Hospital, the hospital closest to the point of release (5 miles), reported examining 44 individuals in the emergency department (ED) from July 7, 2009 through July 10, 2009 with symptoms consistent with acute exposure to ethyl acrylate. The

frequent symptoms included eye, nose, and throat irritation, nausea, headache, and dizziness. Forty-four individuals were treated at the St. Charles Parish Hospital ED with various symptoms that reportedly were the result of chemical exposure (See Appendix C). Two individuals were hospitalized. Follow-up with these individuals indicated that the symptoms had resolved in 2 weeks for 61% of those who had sought ED treatment. The discrepancy between the lack of detection of ethyl acrylate and the observed health effects may be due to the timing of the sample collection, location of the monitors and/or of the sensitivity of instrumentation to detect ethyl acrylate.

**Public Health Actions:**

No public health actions are recommended at this time. The release was an acute event. The health complaints involved primarily short term reversible symptoms that have resolved.

**Conclusions**:

An accident occurred from Dow Chemical in Taft, Louisiana resulting in fugitive air releases of ethyl acrylate on July 7, 2009; a smaller release occurred during clean up on July 9, 2009. The St. Charles Parish Emergency Operations Center closed roads and evacuated people immediately downwind of the Dow facility. LDEQ conducted air monitoring at their fixed air monitoring station 2 miles away and with additional sampling nearer the facility. Ethyl acrylate was not detected in any of the air samples. However, numerous residents living downwind reported eye, nose and throat irritation immediately following the release; 44 sought treatment at the St. Charles Hospital with symptoms consistent with acute exposure to ethyl acrylate. The LDEQ air sample data we have assessed was collected to monitor the release for regulatory purposes and may not give an accurate representation of contaminant concentrations in residential locations further downwind of the facility where no samples were collected. A limitation in the air data are gaps in time of sample collection and the initial release and location of the air monitors. No samples were able to be collected at the time of the primary release until LDEQ could bring in additional air sampling equipment. Many individuals reporting symptoms were several miles downwind and beyond the location of the air monitors.

All volatile organic compounds detected at the sampling locations were below health-based comparison values for short-term exposure. At the time of the release of ethyl acrylate and a few days after the release, the Dow facility could harm people's health because it caused temporary adverse health effects in some residents in communities downwind of the facility. Since we do not expect any continuing exposure or long-term adverse health effects from this past exposure, the site currently will not harm people's health.

If there are any questions regarding this health consultation, please contact Kathleen Aubin at 504-219-4575.

Sincerely,

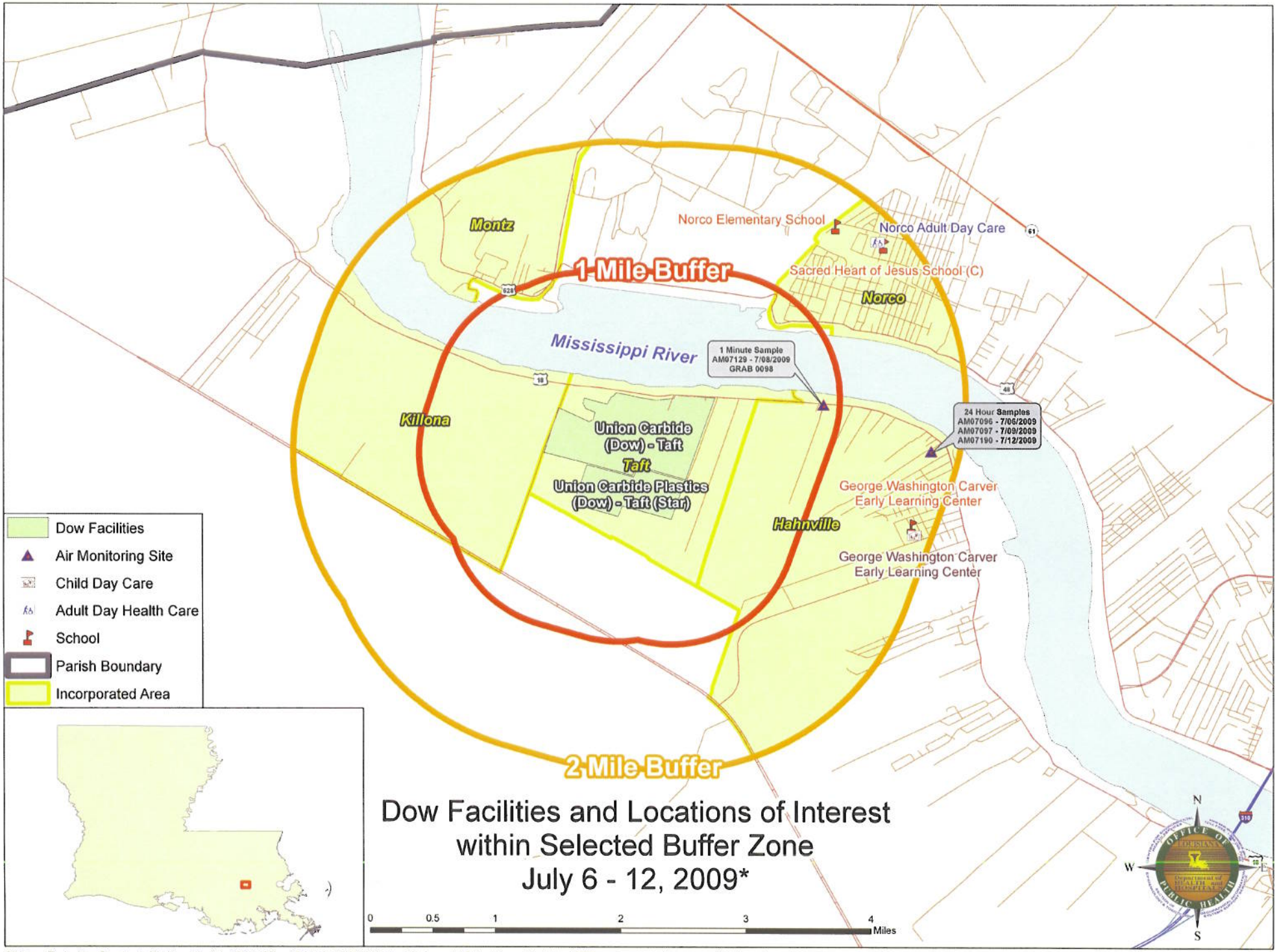
Kathleen Aubin, MSPH
Environmental Health Scientist
Louisiana Office of Public Health
Section of Environmental Epidemiology & Toxicology

## References


1. United States Department of Labor Occupational Safety and Health Administration. Accessed18 August 2009 at URL: http://www.osha.gov/SLTC/healthguidelines/ethylacrylate/recognition.html

2. Texas Commision of Environmental Quality. Accessed 20 August 2009 at URL: http://www.tceq.state.tx.us/implementation/tox/esl/ESLMain.html.

## APPENDIX A: Map of the Dow Chemical Facilities Air Monitor Locations




# Dow Facilities and Locations of Interest within Selected Buffer Zone July 6 - 12, 2009*



*Map produced July 15, 2009 using the following data: 2008 LDHH Care Facility Database, 2008 Louisiana Department of Social Services (LDSS) Care Facility Database, 2008 SEET Hospital Database, 2008 Louisiana Department of Education (LDOE) School Database and the 2002 Lower Mississippi River Industrial Corridor Study (LMRICS). Population Density estimated using 2000 US Census Block data.

# APPENDIX B: Evaluation Process

**Screening Process**

Comparison values (CVs) are media-specific concentrations of chemicals that are used by health assessors to screen environmental contaminants for further evaluation. These values are not used as predictors of adverse health effects. The comparison value used in the evaluation of St. Charles Parish air monitoring is listed below:

*Environmental media evaluation guides* (EMEGs) are estimated contaminant concentrations at which noncarcinogenic health effects are likely. They are calculated from the Agency for Toxic Substances and Disease Registry's (ATSDR) minimal risk levels (MRLs). If there was no EMEG established for a chemical, the short term ESL was used for comparison.

*Effects Screening Levels* (ESLs) are used to evaluate the potential for effects to occur as a result of exposure to concentrations of constituents in the air (2). ESLs are based on data concerning health effects, the potential for odors to be a nuisance, effects on vegetation, and corrosive effects. If predicted or measured airborne levels of a constituent **do not exceed** the screening level, adverse health or welfare effects are not expected. If ambient levels of constituents in air **exceed** the screening levels, it does not necessarily indicate a problem but rather triggers a review in more depth. "Short-term" generally indicates a one-hour averaging period. "Long-term" indicates an annual averaging period.

Table B-1 lists ethyl acrylate air sample collection dates, locations, and results.

Table B-2 lists Target Analytes detected in the three 24 hour samples collected by LDEQ

Table B-3 lists Target Analytes detected in one minute grab sample collected by LDEQ

**Table B-1: Ethyl acrylate air samples, Sampled by the Louisiana Department of Environmental Quality. July 2009.**

| Sample ID | Collection Date | Collection Location | Analysis Method | Concentration (ppb*) | Detection Limit (ppb) | Short Term ESL*** (ppb) |
|---|---|---|---|---|---|---|
| AM07096 | 7/6/2009 | Hahnville | GC/MS | ND** | 0.2 | 1.2 |
| AM07129 | 7/8/2009 | Hwy.18,Taft-Grab | GC/MS | ND | 0.2 | 1.2 |
| AM07097 | 7/9/2009 | Hahnville | GC/MS | ND | 0.2 | 1.2 |
| AM07190 | 7/12/2009 | Hahnville | GC/MS | ND | 0.2 | 1.2 |

*ppb=parts per billion

**ND = not detected

***ESL = Effects Screening Levels

## Table B-2: Target Analytes detected in three 24 hour air samples collected by LDEQ July 6, 2009 through July 12, 2009

| | | Concentration Range (ppb) | | | |
|---|---|---|---|---|---|
| Target Analytes | Analysis Method | Low | High | CV (ppb) | CV Reference |
| 1,1,1-trichloroethane | GC/MS | 0.02 | 0.02 | 2000 | acute EMEG |
| 1,2 dichloroethane | GC/MS | ND | 0.05 | 40 | Short term ESL |
| 1,2,3-trimethylbenzene | GC/FID | 0.02 | 0.07 | 250 | Short term ESL |
| 1,2,4-trichlorobenzene | GC/MS | ND | 0.01 | 50 | Short term ESL |
| 1,2,4-trimethylbenzene | GC/MS | 0.03 | 0.03 | 50 | Short term ESL |
| 1,2,4-trimethylbenzene | GC/FID | 0.03 | 0.06 | 250 | Short term ESL |
| 1,3,5-trimethylbenzene | GC/MS | 0.01 | 0.01 | 250 | Short term ESL |
| 1,3,5-trimethylbenzene | GC/FID | 0.02 | 0.05 | 250 | Short term ESL |
| 1,3-butadiene | GC/FID | 0.02 | 0.03 | 230 | Short term ESL |
| 1,3-butadiene | GC/MS | ND | 0.04 | 230 | Short term ESL |
| 1,3-dichlorobenzene | GC/MS | ND | 0.01 | 120 | Short term ESL |
| 1,3-hexachlorobutadiene | GC/MS | ND | 0.01 | 0.2 | Short term ESL |
| 1,4-dichlorobenzene | GC/MS | ND | 0.01 | 2000 | acute EMEG |
| 1-butene | GC/FID | 0.05 | 0.24 | 360 | Short term ESL |
| 1-hexene | GC/FID | 0.02 | 0.06 | 20 | Short term ESL |
| 1-pentene | GC/FID | 0.03 | 0.07 | 100 | Short term ESL |
| 2,2,4-trimethylpentane | GC/FID | 0.08 | 0.12 | 750 | Short term ESL |
| 2,2-dimethylbutane | GC/FID | 0.04 | 0.08 | 993 | Short term ESL |
| 2,3,4-trimethylpentane | GC/FID | 0.02 | 0.03 | 750 | Short term ESL |
| 2,3-dimethylbutane | GC/FID | 0.03 | 0.08 | 993 | Short term ESL |
| 2,3-dimethylpentane | GC/FID | 0.02 | 0.04 | 854 | Short term ESL |
| 2,4-dimethylpentane | GC/FID | 0.02 | 0.02 | 854 | Short term ESL |
| 2-butanone | GC/MS | 0.21 | 0.36 | 1300 | Short term ESL |
| 2-methylbutane | GC/FID | 0.96 | 1.33 | 1200 | Short term ESL |
| 2-methylheptane | GC/FID | 0.02 | 0.02 | 749 | Short term ESL |
| 2-methylhexane | GC/FID | 0.04 | 0.08 | 750 | Short term ESL |
| 2-methylpentane | GC/FID | 0.13 | 0.27 | 83 | Short term ESL |
| 2-nitropropane | GC/MS | ND | 0.06 | 14 | Short term ESL |
| 3-methlyheptane | GC/FID | 0.02 | 0.03 | 749 | Short term ESL |
| 3-methylhexane | GC/FID | 0.06 | 0.09 | 749 | Short term ESL |
| 3-methylpentane | GC/FID | 0.08 | 0.4 | 1000 | Short term ESL |
| acetone | GC/MS | 1.99 | 4.07 | 30000 | acute EMEG |
| Acetonitrile | GC/MS | 0.2 | 0.25 | 200 | Short term ESL |
| Acetylene | GC/FID | 0.14 | 0.57 | 25000 | Short term ESL |
| acrylonitrile | GC/MS | 0.25 | 1.63 | 100 | acute EMEG |
| benzene | GC/FID | 0.13 | 0.2 | 9 | acute EMEG |
| benzene | GC/MS | 0.11 | 0.17 | 9 | acute EMEG |
| carbon disulfide | GC/MS | 0.02 | 0.04 | 10 | Short term ESL |
| carbon tetrachloride | GC/MS | 0.08 | 0.09 | 20 | Short term ESL |
| chloroform | GC/MS | 0.02 | 0.04 | 100 | acute EMEG |
| Chloromethane | GC/MS | 0.75 | 0.96 | 500 | acute EMEG |
| cis-2-butene | GC/FID | 0.02 | 0.09 | 2100 | Short term ESL |
| cis-2-pentene | GC/FID | ND | 0.04 | 2600 | Short term ESL |
| cumene | GC/FID | ND | 0.01 | 100 | Short term ESL |
| cyclohexane | GC/FID | 0.06 | 0.09 | 420 | Short term ESL |
| cyclopentane | GC/FID | 0.03 | 0.08 | 1200 | Short term ESL |
| Ethane | GC/FID | 3.58 | 5.17 | 10000 | Short term ESL |
| ethylbenzene | GC/MS | 0.03 | 0.04 | 10000 | acute EMEG |
| ethylbenzene | GC/FID | 0.03 | 0.07 | 10000 | acute EMEG |
| Ethylene | GC/FID | 0.63 | 2.29 | 1200 | Short term ESL |
| Freon-11 | GC/MS | 0.22 | 0.23 | 5000 | Short term ESL |
| Freon-113 | GC/MS | 0.08 | 0.09 | 5000 | Short term ESL |

**Table B-2: Target Analytes detected in three 24 hour air samples collected by LDEQ July 6, 2009 through July 12, 2009 (continued)**

| | | | | | |
|---|---|---|---|---|---|
| Freon-114 | GC/MS | 0.02 | 0.02 | 10000 | Short term ESL |
| Freon-12 | GC/MS | 0.49 | 0.52 | 10000 | Short term ESL |
| Isobutane | GC/FID | 0.94 | 1.34 | 2040 | Short term ESL |
| isoprene | GC/FID | 0.75 | 0.85 | 5 | Short term ESL |
| m p xylene | GC/FID | 0.11 | 0.22 | 80 | Short term ESL |
| m p xylene | GCMS | 0.08 | 0.11 | 80 | Short term ESL |
| m-diethylbenzene | GC/FID | ND | 0.01 | 460 | Short term ESL |
| methylcyclohexane | GC/FID | 0.06 | 0.1 | 4000 | Short term ESL |
| methylcyclopentane | GC/FID | 0.06 | 0.13 | 750 | Short term ESL |
| methylene chloride | GC/MS | 0.07 | 0.08 | 600 | acute EMEG |
| m-ethyltoluene | GC/FID | 0.03 | 0.05 | 250 | Short term ESL |
| n-butane | GC/FID | 0.25 | 1.21 | 8000 | Short term ESL |
| n-decane | GC/FID | 0.02 | 0.03 | 1750 | Short term ESL |
| n-heptane | GC/FID | 0.06 | 0.09 | 850 | Short term ESL |
| n-hexane | GC/FID | 0.16 | 0.26 | 1500 | Short term ESL |
| nitrobenzene | GC/MS | ND | 0.03 | 5 | Short term ESL |
| n-nonane | GC/FID | 0.03 | 0.05 | 2000 | Short term ESL |
| n-octane | GC/FID | 0.04 | 0.05 | 750 | Short term ESL |
| n-pentane | GC/FID | 0.36 | 0.68 | 1200 | Short term ESL |
| n-propylbenzene | GC/FID | 0.01 | 0.02 | 254 | Short term ESL |
| n-undecane | GC/FID | 0.02 | 0.03 | 547 | Short term ESL |
| o-ethyltoluene | GC/FID | 0.03 | 0.05 | 250 | Short term ESL |
| o-xylene | GC/FID | 0.04 | 0.07 | 380 | Short term ESL |
| o-xylene | GC/MS | 0.03 | 0.04 | 380 | Short term ESL |
| p-diethylbenzene | GC/FID | ND | 0.02 | 460 | Short term ESL |
| p-ethyltoluene | GC/FID | 0.01 | 0.02 | 250 | Short term ESL |
| Propane | GC/FID | 2.39 | 4.86 | 10000 | Short term ESL |
| Propylene | GC/FID | 0.52 | 0.79 | 5000 | Short term ESL |
| styrene | GC/FID | 0.01 | 0.03 | 2000 | acute EMEG |
| styrene | GC/MS | ND | 0.02 | 2000 | acute EMEG |
| tetrachloroethylene | GC/MS | ND | 0.06 | 200 | acute EMEG |
| toluene | GC/MS | 0.19 | 0.24 | 1000 | acute EMEG |
| toluene | GC/FID | 0.24 | 0.4 | 1000 | acute EMEG |
| trans-2-butene | GC/FID | 0.02 | 0.12 | 2100 | Short term ESL |
| Trans-2-pentane | GC/FID | 0.04 | 0.07 | 2600 | Short term ESL |

GC/MS = Gas Chromatograph separation with Mass Selective Detector

GC/FID = Gas Chromatograph separation with Flame Ionization Detector

ND = Non detect

CV = Comparison Value

ESL = Effects Screening Level

## Table B-3: Target Analytes detected in 1 minute grab air sample, July 8, 2009

| Target Analytes | Analysis Method | Concentration (ppb) | CV (ppb) | CV Reference |
|---|---|---|---|---|
| 1,1,1-trichloroethane | GC/MS | 0.04 | 2000 | Acute EMEG |
| 1,2 dichloroethane | GC/MS | 0.03 | 40 | Short Term ESL |
| 1,1 dichloroethane | GC/MS | 0.02 | 1000 | Short Term ESL |
| 1,1 dichloroethene | GC/MS | 0.03 | 54 | Short Term ESL |
| 2,3-dimethylpentane | GC/FID | 0.02 | 854 | Short Term ESL |
| 1,2,4-trichlorobenzene | GC/MS | 0.04 | 50 | Short Term ESL |
| 1,2,4-trimethylbenzene | GC/MS | 0.03 | 250 | Short Term ESL |
| 1,2,4-trimethylbenzene | GC/FID | 0.02 | 250 | Short Term ESL |
| 1,3,5-trimethylbenzene | GC/MS | 0.02 | 250 | Short Term ESL |
| 1,3,5-trimethylbenzene | GC/FID | 0.02 | 250 | Short Term ESL |
| 1,3-butadiene | GC/FID | 0.03 | 230 | Short Term ESL |
| 1,2-dichlorobenzene | GC/MS | 0.03 | 120 | Short Term ESL |
| 1,3-dichlorobenzene | GC/MS | 0.03 | 120 | Short Term ESL |
| 1,3-hexachlorobutadiene | GC/MS | 0.03 | 0.2 | Short Term ESL |
| 1,4-dichlorobenzene | GC/MS | 0.03 | 2000 | acute EMEG |
| 1-butene | GC/FID | 0.05 | 360 | Short Term ESL |
| 1-pentene | GC/FID | 0.02 | 100 | Short Term ESL |
| 2,2,4-trimethylpentane | GC/FID | 0.03 | 750 | Short Term ESL |
| 2,2-dimethylbutane | GC/FID | 0.03 | 993 | Short Term ESL |
| 2,3,4-trimethylpentane | GC/FID | 0.02 | 750 | Short Term ESL |
| 2,3-dimethylbutane | GC/FID | 0.02 | 993 | Short Term ESL |
| 2-hexanone | GC/MS | 0.05 | 10 | Short Term ESL |
| 2,4-dimethylpentane | GC/FID | 0.01 | 854 | Short Term ESL |
| 1,2-dibromoethane | GC/MS | 0.03 | 0.5 | Short Term ESL |
| 2-butanone | GC/MS | 0.34 | 2000 | Acute EMEG |
| 2-methylbutane | GC/FID | 0.50 | 1200 | Short Term ESL |
| 2-methylhexane | GC/FID | 0.03 | 750 | Short Term ESL |
| 2-methylpentane | GC/FID | 0.08 | 83 | Short Term ESL |

## Table B-3: Target Analytes detected in 1 minute grab air sample, July 8, 2009 (cont)

| Target Analytes | Analysis Method | Concentration (ppb) | CV (ppb) | CV Reference |
|---|---|---|---|---|
| 1,2 dichloropropane | GC/MS | 0.03 | 250 | Short Term ESL |
| 3-methylheptane | GC/FID | 0.02 | 749 | Short Term ESL |
| 3-methylhexane | GC/FID | 0.03 | 749 | Short Term ESL |
| 3-methylpentane | GC/FID | 0.04 | 1000 | Short Term ESL |
| 1,1,2-trichloroethane | GC/MS | 0.03 | 100 | Short Term ESL |
| acetone | GC/MS | 3.10 | 30000 | Acute EMG |
| acetonitrile | GC/MS | 0.17 | 200 | Short Term ESL |
| Acetylene | GC/FID | 0.14 | 0.2 | Short Term ESL |
| Allyl chloride | GC/MS | 0.02 | 10 | Short Term ESL |
| Benzene | GC/FID | 0.08 | 9 | Acute EMG |
| Benzene | GC/MS | 0.09 | 9 | Acute EMG |
| Benzyl chloride | GC/MS | 0.03 | 10 | Short Term ESL |
| Carbon disulfide | GC/MS | 0.05 | 10 | Short Term ESL |
| Carbon tetrachloride | GC/MS | 0.11 | 20 | Short Term ESL |
| Chlorobutane | GC/MS | 0.02 | 890 | Short Term ESL |
| Chloroform | GC/MS | 0.04 | 100 | Acute EMG |
| Chloromethane | GC/MS | 0.96 | 500 | Acute EMG |
| Cis-1,3-dichloropropene | GC/MS | 0.02 | 10 | Short Term ESL |
| Cyclohexane | GC/FID | 0.04 | 420 | Short Term ESL |
| Cyclopentane | GC/FID | 0.02 | 1200 | Short Term ESL |
| Ethane | GC/FID | 2.95 | 10000 | Short Term ESL |
| Ethylbenzene | GC/MS | 0.02 | 10000 | Acute EMG |
| Ethylbenzene | GC/FID | 0.01 | 10000 | Acute EMG |
| Ethylene | GC/FID | 0.27 | 1200 | Short Term ESL |
| Freon-11 | GC/MS | 0.25 | 5000 | Short Term ESL |
| Freon-113 | GC/MS | 0.11 | 5000 | Short Term ESL |
| Freon-114 | GC/MS | 0.05 | 10000 | Short Term ESL |
| Freon-12 | GC/MS | 0.54 | 10000 | Short Term ESL |
| isobutane | GC/FID | 0.56 | 2040 | Short Term ESL |
| Isoprene | GC/FID | 0.77 | 5 | Short Term ESL |
| m p  xylene | GC/FID | 0.03 | 2000 | Acute EMG |
| M p xylene | GC/MS | 0.04 | 2000 | Acute EMG |
| methylcylcohexane | GC/FID | 0.03 | 4000 | Short Term ESL |
| methylcylcopentane | GC/FID | 0.04 | 750 | Short Term ESL |
| Methylene chloride | GC/MS | 0.09 | 600 | Acute EMG |
| n-butane | GC/FID | 0.62 | 8000 | Short Term ESL |
| n-decane | GC/FID | 0.02 | 1750 | Short Term ESL |
| n-heptane | GC/FID | 0.03 | 850 | Short Term ESL |
| n-hexane | GC/FID | 0.08 | 1500 | Short Term ESL |
| nitrobenzene | GC/MS | 0.11 | 5 | Short Term ESL |
| n-nonane | GC/FID | 0.03 | 2000 | Short Term ESL |
| n-octane | GC/FID | 0.02 | 750 | Short Term ESL |
| n-pentane | GC/FID | 0.22 | 1200 | Short Term ESL |
| n-propylbenzene | GC/FID | 0.01 | 254 | Short Term ESL |
| n-undecane | GC/FID | 0.02 | 547 | Short Term ESL |
| o-ethyltoluene | GC/FID | 0.06 | 250 | Short Term ESL |
| o-xylene | GC/FID | 0.02 | 380 | Short Term ESL |
| o-xylene | GC/MS | 0.03 | 380 | Short Term ESL |
| p-diethylbenzene | GC/FID | 0.01 | 460 | Short Term ESL |
| propane | GC/FID | 2.14 | 10000 | Short Term ESL |
| propylene | GC/FID | 0.12 | 5000 | Short Term ESL |
| styrene | GC/FID | 0.01 | 2000 | Acute EMG |
| styrene | GC/MS | 0.02 | 2000 | Acute EMG |
| tetrachloroethylene | GC/MS | 0.02 | 200 | Acute EMG |
| toluene | GC/MS | 0.07 | 1000 | Acute EMG |
| toluene | GC/FID | 0.06 | 1000 | Acute EMG |
| trichloroethylene | GC/MS | 0.02 | 100 | Short Term ESL |
| 1,1,2,2-tetrachloroethane | GC/MS | 0.03 | 10 | Short Term ESL |
| Trans-1,3 dichloropropene | GC/MS | 0.02 | 10 | Short Term ESL |

GC/MS = Gas Chromatograph separation with Mass Selective Detector

GC/FID = Gas Chromatograph separation with Flame Ionization Detector

ND = Non detect

CV = Comparison Value

ESL = Effects Screening Level

# APPENDIX C: Evaluation of St. Charles Parish Hospital Emergency Department Visits After Dow's Release

**Evaluation of St. Charles Parish Hospital Emergency Department Visits after DOW's Ethyl Acrylate Release**

## Background

*DOW Release*
On July 7, 2009 at approximately 4:45 am a tank failure occurred at DOW Chemical in Taft, LA resulting in fugitive air releases of ethyl acrylate. A subsequent release was reported on July 9, 2009. On the morning of the July 7th release, the St. Charles Parish Emergency Operations Center (EOC) initiated emergency procedures and shut down Highway LA 18 near the facility at 7:10 am. At 8:30 am evacuation ordors were given to Hahnville residents in the 15 houses nearest to the facility. Access to this site was restricted to emergency personnel only. At 8:49 am, officials released public statements informing residents about the release, possible side-effects and the location of a nearby shelter for voluntary evacuations.

*Ethyl Acrylate*
Ethyl acrylate is a volatile organic compound used in the manufacture of water-based paints, adhesives, plastics and many other products. It has a very strong acrid odor that can be detected at very low levels (100 to 500 ppb). The health effects of ethyl acrylate are related to its irritant properties. Acute exposure may cause irritation of the eyes, nose, throat and other mucus membranes, with tearing, runny nose and burning of the throat. The degree and length of irritation is related to the concentration in air inhaled and the duration of exposure. Headache and nausea may occur related to the strong odors.

*Purpose*
Officials from St. Charles Parish Hospital, the hospital closest to the point of release (5 miles), reported seeing individuals after the release in the emergency department (ED) with symptoms of ethyl acrylate exposure- eye, nose and throat irritation. To evaluate exposures, affected populations and symptoms, a review of ED logs and follow up exposure phone survey were conducted for individuals entering the St. Charles Parish Hospital ED after the release. This report summarizes the demographics, exposure details and symptoms for this population. It is not a comprehensive account of all related exposures as individuals interviewed reported visits to other hospitals such as Kenner Regional and the Veterans Affairs (VA) Hospital. Thus, this report is merely an assessment of a subgroup of the affected population to characterize exposures and symptoms.

## Methods

St. Charles Parish Hospital ED logs from 12 am of 7/6/09 to 11:50 pm of 7/10/09 were reviewed to identify potential exposure "cases". Cases are defined as individuals with initial complaints or diagnoses of chemical exposure or eye, nose and throat irritation. Data derived from ED logs and medical records included: ED visit date and time, age, sex, address, contact information, ED disposition (outpatient or hospitalized), initial complaints and diagnosis. Follow up calls were conducted to derive information on occupation, exposure location and time, other symptoms, and symptom duration. Summary statistics were generated and are presented in this report.

## Results

*Exposure Date*

Between 7/7/09 and 7/10/09, 44 individuals were treated during 46 visits to the St. Charles Parish Hospital ED with either a primary complaint or diagnosis of "Chemical Exposure" or eye, nose and throat irritation. Two of these individuals visited the ED twice during this time. For comparison, a baseline was established for ED visits using cases visiting the St. Charles Parish Hospital ED on 7/5/09 and 7/6/09 (n= 1 and 4, respectively).

| Date | ED Visits | Reported Exposure |
|---|---|---|
| 7/7/2009 | 25 | 37 |
| 7/8/2009 | 8 | 0 |
| 7/9/2009 | 7 | 9 |
| 7/10/2009 | 6 | - |
| **Grand Total** | **46** | **46** |

Follow up calls were made to all but two patients and a family of three (n=5)- these individuals could not be reached or did not return multiple messages. Reported exposure dates were derived from patient recollection during follow up, and represent when odors were first perceived or symptoms first began. Unknown exposure dates were assumed to have occurred the day of, or the day before the ED visit date, on a day in which a release occurred (n=5). 87% of reported exposures and 54% of ED visits occurred on the date of the first major ethyl acrylate release (7/7/09). Due to the persistence of symptoms 30% of individuals visited the ED the day after they were exposed.

*Demographics*

56% of ED visitors were male. There were several reports from individuals that can be defined as more "sensitive" to chemical exposures- these include individuals with asthma, COPD, glaucoma and the elderly and young. 14% were < 20 years- no child younger than 6 years visited the ED. According to the St. Charles Parish Office of Emergency Preparedness, area schools in session for summer classes / camps and child-care facilities did not report evacuations or school dismissals. 25% of ED visitors are retired and 48% of ED visitors are ≥50 years. Four ED visitors were on-duty officers. All of these officers were directing traffic around roadblocks near the site of release. It is unknown if protective gear was used during this emergency response.

| Occupation | Count |
|---|---|
| Retired | 11 |
| Student | 7 |
| Sherrif's Deputy | 5 |
| Construction / Painter | 4 |
| Vendor / Store | 3 |
| Disabled | 2 |
| Nurse | 1 |
| Clerical | 1 |
| Farmer | 1 |
| Homemaker | 1 |
| Public Works | 1 |
| Security Guard | 1 |
| Truck Driver | 1 |

| Age | Count |
|---|---|
| 0-9 | 1 |
| 10-19 | 5 |
| 20-29 | 5 |
| 30-39 | 3 |
| 40-49 | 9 |
| 50-59 | 14 |
| 60-69 | 5 |
| 70-79 | 2 |
| **TOTAL** | **44** |

| | |
|---|---|
| Unemployed | 1 |
| (blank) | 4 |
| **TOTAL** | **44** |

*Symptoms and Diagnoses*

65% had initial complaints of chemical exposure and 83% were diagnosed with chemical exposure. The initial complaint and diagnosis of "chemical exposure" was used generically in this case for eye, nose and throat irritation, as these are specific health effects of ethyl acrylate. Eye and throat irritation, nausea, headache and dizziness were the predominant symptoms reported (over 10 complaints) in the post-ED patient interviews. 95% of ED visitors were treated as outpatients (n=42).

| | **Reported Symptoms** | **%** | **Initial Complaint** | **%** | **Diagnosis** | **%** |
|---|---|---|---|---|---|---|
| "Chemical Exposure" | | | 30 | 65 | 38 | 83 |
| Eye Irritation / Burning | 27 | 19 | 12 | 26 | | |
| Nausea | 19 | 13 | 1 | 2 | | |
| Headache | 17 | 12 | | | | |
| Throat Irritation / Dryness | 15 | 10 | | | | |
| Dizziness | 13 | 9 | 1 | 2 | | |
| Stomach Ache / Cramps | 6 | 4 | | | 1 | 2 |
| Vomiting | 6 | 4 | | | | |
| Coughing | 6 | 4 | | | | |
| Nasal Irritation / Burning | 6 | 4 | | | | |
| Shortness of Breath / Trouble Breathing | 7 | 5 | | | | |
| Chest Hurting / Tightness | 3 | 2 | | | | |
| Elevated Blood Pressure | 3 | 2 | | | 1 | 2 |
| Asthma Exacerbation | 3 | 2 | 2 | 4 | 1 | 2 |
| Sneezing | 3 | 2 | | | | |
| Conjuctivitis | 2 | 1 | | | 1 | 2 |
| Numbness of Extremities | 2 | 1 | | | | |
| Diahrrea | 2 | 1 | | | | |
| Rash / Hives | 1 | 1 | | | | |
| Burning Skin | 1 | 1 | | | | |
| Metallic Taste | 1 | 1 | | | | |
| Metallic Taste | 1 | 1 | | | | |
| COPD Exacerbation | | | | | 1 | 2 |
| Toothache | | | | | 1 | 2 |
| None Recorded in ED Log | | | | | 2 | 4 |
| TOTAL | 144 | 100 | 46 | 100 | 46 | 100 |

Two individuals were hospitalized- both were retired, aged 54 and 60. One male came in for eye, nose and throat burning and was admitted for shortness of breath. One female came in for asthma exacerbation and was admitted for COPD exacerbation (chronic obstructive pulmonary disease).

The first diagnosed case of "chemical exposure" visited the ED on 7/7/09 at 8:12 am. By noon that day, 10 more cases diagnosed with chemical exposure had arrived. The frequency of this type of diagnosis suggests that chemical exposures are a common occurrence in this area. However, as EOC response began at 7:20 am, it is possible that doctors had been alerted and knew which symptoms to anticipate.

*Symptom Duration*

61% of individuals interviewed by phone reported that symptoms had resolved in the follow up survey. 16% said symptoms lasted 1 day or less; 42% said symptoms lasted between 2 to 3 days; and 44% said they lasted 1 week or more. Those reporting symptoms lasting over 1 week (n=13) are younger than 20 (n=2) or older than 40 (n=11). All but one of these individuals had either an initial complaint or diagnosis of chemical exposure- one came in for and was diagnosed with asthma exacerbation. These individuals may be more sensitive to chemical exposures due to age, health or proximity to the release. Five are retired, three reported having asthma, one had eye surgery. 68% were exposed in Hahnville (n=9). All were treated as outpatients. 46% (n=6) of these individuals reported returning to the hospital since the initial ED visit. 38% have no insurance. If we assume ED costs are prohibitive, symptoms may have been severe for these individuals. 30% of all ED visitors (regardless of symptom duration) have no insurance (n=13).

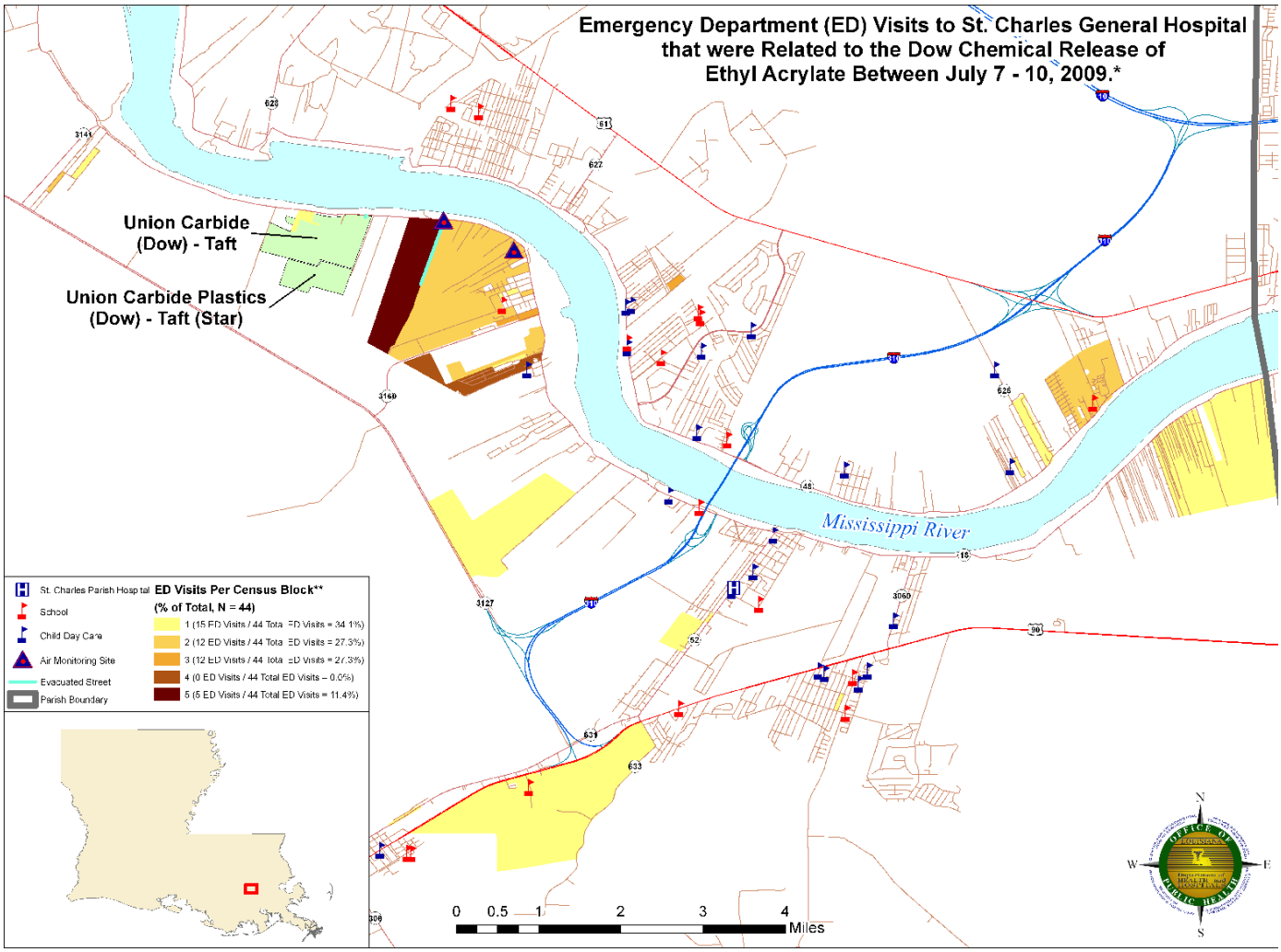
| Symptom Duration | Count |
|---|---|
| 1 day | 6 |
| 2 days | 11 |
| 3 days | 4 |
| 1 week | 4 |
| 9 days | 1 |
| 2 weeks | 4 |
| 2 weeks + | 8 |
| (blank) | 6 |
| **TOTAL** | **44** |

*Exposure Location*

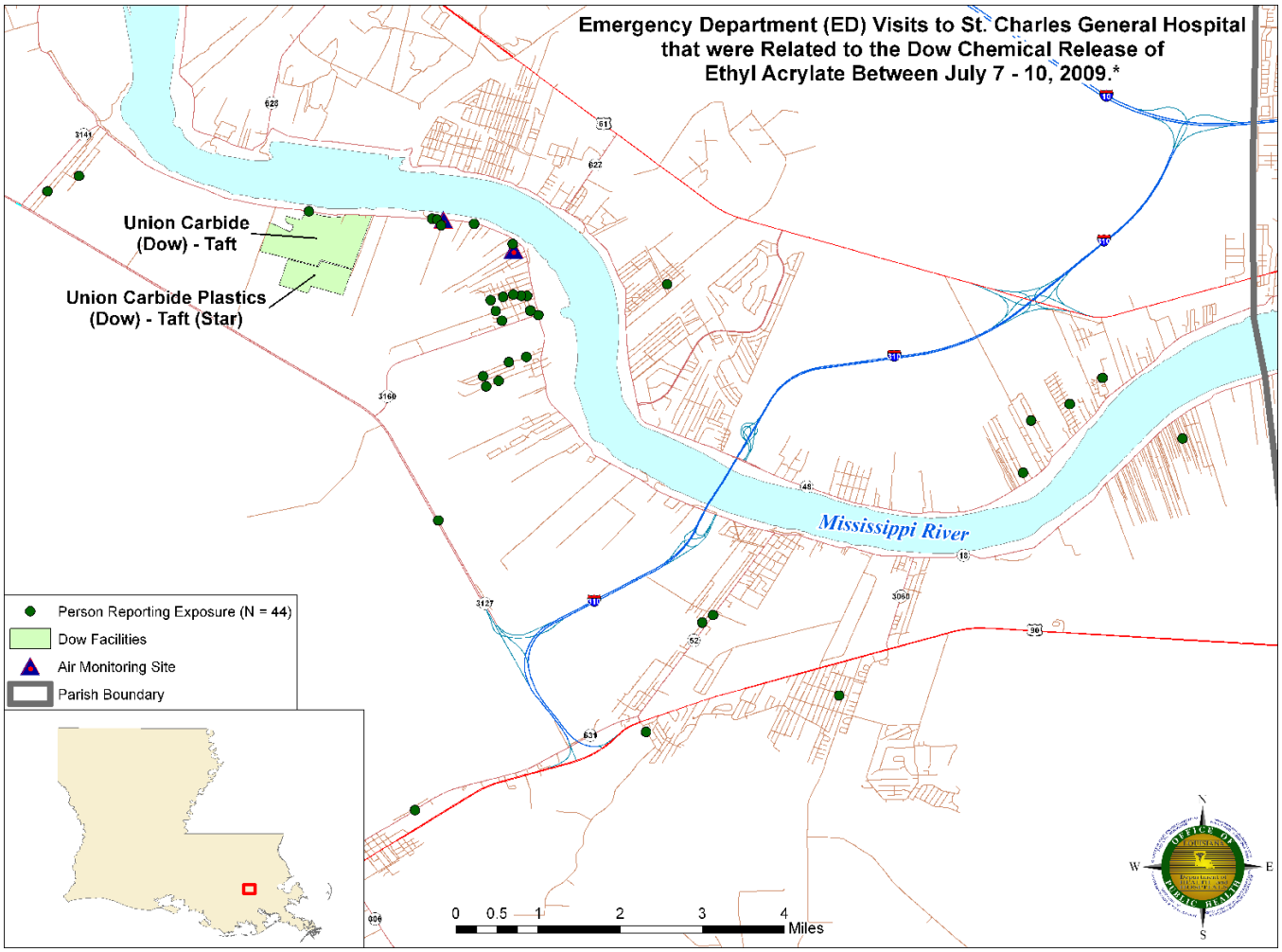
49% of exposures were reported to have occurred in Hahnville and 66% reported that first exposures occurred in the home. All ED visits to St. Charles Parish Hospital were by individuals located downwind to the east of the facility and 39% (n=17) were located within a 2 mile radius (see attached maps); however some ED visits were by individuals located over 10 miles away.

| Exposure City | Count |
|---|---|
| Hahnville | 26 |
| St. Rose | 6 |
| Luling | 3 |
| New Sarpy | 3 |
| Taft | 2 |
| Ama | 1 |
| Boutte | 1 |
| Killona | 1 |
| Paradis | 1 |
| **TOTAL** | **44** |

| Exposure Location | Count |
|---|---|
| home | 25 |
| work | 6 |
| car (on errand) | 4 |
| relative's home | 2 |
| jogging | 1 |
| (blank) | 6 |
| **TOTAL** | **44** |




Disclaimer: The Louisiana Department of Health and Hospitals (LDH / LDH) / Office of Public Health (OPH) / Section of Environmental Epidemiology and Toxicology (SEET) cannot guarantee the accuracy of the information contained on these maps and expressly disclaims liability for errors and omissions in their contents.
*Map produced July 31, 2009 using the following data: 2008 Louisiana Department of Social Services (LDSS) Care Facility Database, 2008 NHI Hospital Database, 2008 Louisiana Department of Education (LDOE) School Database and the 2007 Lower Mississippi River Industrial Corridor Study (LMRICS)
** Percentages may not add up to 100% due to rounding.


Emergency Department (ED) Visits to St. Charles General Hospital
that were Related to the Dow Chemical Release of
Ethyl Acrylate Between July 7 - 10, 2009.*
Union Carbide
(Dow) - Taft
Union Carbide Plastics
(Dow) - Taft (Star)
Mississippi River
Person Reporting Exposure (N = 44)
Dow Facilities
Air Monitoring Site
Parish Boundary
0 0.5 1 2 3 4
Miles
N
W
E
S

**Dow Chemical Hahnville: Ethyl Acrylate Leaks on 7/7/09 and 7/9/09**
**Detailed Info for ED Visits with Eye, Nose, Throat Irritation from 7/7/09 through 7/10/09**

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Hospital: St. Charles Parish Hospital ED Visit Date: ____/____/____

Time: _____

**Demographics**

1. Name: _____
2. Age: _____ years
3. Gender (circle one): Male Female
4. Phone 1: _____ (circle one: Home Work Cell Other)
   Phone 2: _____ (circle one: Home Work Cell Other)
5. Home Address:
   _____
6. Occupation:
   _____

**Exposure/Symptoms/Disposition**

7. Exposure Date: _____/_____/_____ Time: _____
8. Location where exposure occurred (provide address if somewhere other than home address):
   _____
9. Complaint(s):
   _____
   _____
10. ED Disposition (circle one): Outpatient Hospitalized
11. Insurance:
    _____
12. How long did symptoms last? Have they resolved?
    _____

## Certification

This Dow Chemical letter health consultation was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures at the time the health consultation was begun. The editorial review was conducted by the Cooperative Agreement Partner.

Jeffrey Kellam
Technical Project Officer, Division of Health Assessment and Consultation (DHAC)

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

Alan W. Yarbrough
Cooperative Agreement Team Leader, DHAC, ATSDR