Appendix 1

Past ACE Investigations

- Chlorine release at metal recycling facility, California 2010
  - Requesting agency: California Department of Public Health
  - Data collected:
    - Interviewed potentially exposed employees and customers, and those present in neighboring businesses
    - Conducted an industrial hygiene walk-through of the facility
  - Sampling: None. Interviewed all available persons who were in the area since there were so few (n=27); two persons were not available at the time of the interviews
  - Response rate: Interviewed the 27/27 (100%) potentially exposed persons who could be contacted
  - Analysis:
    - Descriptive analysis
    - Chi-square analysis and the Fisher's exact test were performed, using need for hospitalization as the outcome measure, in an attempt to determine risk factors for more severe illness to aid in developing recommendations for future incidents
  - Outcome:
    - Developed a fact sheet on dangers of closed tanks and what facilities should do if they encounter one using this incident as an example. This fact sheet was mailed to over 1200 metal recycling facilities
    - Survey data revealed that workers were experiencing respiratory symptoms and they reported difficulty obtaining medical care because their workman's compensation insurance was not universally accepted. Physician at the state health department identified an occupational health physician within driving distance who treated occupationally-related respiratory conditions and accepted their insurance. The physician also provided technical assistance to local non-occupational health physicians in the area who accepted the insurance.
    - Following our recommendation to evacuate upwind in event of a chemical release, the facility purchased a wind sock and provided this training for their workers.

- Ammonia release from a refrigeration facility, Alabama 2010
  - Requesting agency: Alabama Department of Public Health and the Mobile County Health Department
  - Data collected:
    - Interviewed workers (# 113) at a Deepwater Horizon oil spill clean-up site downwind of the release
    - Medical chart reviews of all 152 patients that sought hospital care following the release
  - Sampling: Convenience sample of Deepwater Horizon oil-spill clean-up workers. Workers who chose to participate were interviewed during their breaks in the rest areas. This method was chosen because it was acceptable to the site management and because sampling would have been extremely difficult in the large, outside site where workers often moved around.

- Response rate: Interviewed a convenience sample consisting of 113 workers, approximately 14% of the workers present at the time of the release, assuming the number of workers at the site at the time of interview was similar to the previous week when the release occurred.
- Analysis:
    - Descriptive analysis
    - Bivariate regression analysis to evaluate factors associated with seeking medical care after the incident, having ongoing symptoms at the time of the interview, and being admitted to the hospital to aid in developing recommendations for future incidents.
    - Kappa statistics were used to compare symptoms reported during interview with those captured in medical charts for individuals with data from both sources to determine which was the better source of information.
- Outcome:
    - Because ammonia exposure has the possibility of causing long term health effects and there were 32 people admitted to local hospitals and 120 treated in emergency departments after the incident, we recommended that the county health department follow the health of those known to have been exposed. Later, we arranged for the National Institute of Environmental Health Sciences (NIEHS) to include those known to be exposed to ammonia in the Gulf Long-Term Follow-Up Study
    - Identified a lack of notification of the area surrounding the release; reported on this during an after-action review of the incident
    - Following our recommendation, the state health department surveyed the 5 hospitals where patients were treated to capture the hospitals readiness and experiences and aid in formulating recommendations for chemical incident preparedness

- Chlorine release at a poultry processing plant, Arkansas 2011
    - Requesting agency: Arkansas Department of Health
    - Partner: CDC's National Institute for Occupational Safety and Health (NIOSH) interviewed workers and determined the cause of the release during a Health Hazard Evaluation
    - Data collected:
        - Interviewed staff of hospitals where patients were treated
        - Abstracted medical charts
    - Sampling: Not done. All charts were abstracted (n= 170) since there were enough staff to review all charts in a week
    - Response rate: NIOSH partners interviewed 523 of approximately 600 (87%) workers present during the release; it is unknown how many workers were still out sick at the time the interviews were conducted at their workplace. ACE team interviewed staff at the 5 local hospitals (100%) known to have treated patients from the incident.
    - Analysis:
        - Descriptive analysis
    - Outcome:
        - Identified that the health department had not been notified when the incident occurred, resulting in missed opportunities for their assistance during the response for:

        - coordination with hospitals to determine patient routing
        - language translation at the scene and hospitals
        - preparation of discharge instructions in the patients' native languages
    - Subsequently, the state health department worked with the department of emergency management to modify its notification procedures to include any chemical, biological, nuclear, radiologic, or explosive incident. Two weeks after the new procedures went into effect, two ammonia releases occurred the same morning in the same town as the original chorine release; the health department was promptly notified and able to offer assistance
    - Five months after the incident, when our NIOSH partners were performing a follow-up at the plant, ACE team members presented the findings of the hospital survey and medical chart review to local hospitals and responders. These findings included data that the hospitals needed from responders at the scene. At the conclusion of the presentation, the team facilitated a discussion between the responders and hospitals about improving communication between them and decontamination.

- Vinyl chloride release from a train derailment in a small town, New Jersey 2012
    - Requesting agency: New Jersey Department of Health
    - Partner: NIOSH interviewed responders and answered their questions about potential health effects of vinyl chloride exposure
    - Data collected:
        - Door-to-door in-person general survey of town residents with both household level (such as: Did your household evacuate?) and individual level questions (such as symptoms experienced within 24 hours of the spill, medical care received)
        - Reviewed medical charts
    - Sampling:
        - Household: Two stage sampling similar to what is done during a Community Assessment for Public Health Emergency Response. Randomly selected 10 census blocks in each of 4 zones (based on proximity and whether or not an evacuation was ordered). Randomly selected the first house in each census block then systematically selected 6 more for interviews.
        - Individual: Randomly selected one individual from each household to represent the household for individual-level questions.
    - Response rate: Twenty-seven of 25 hospitals (93%) completed an interview; staff from two hospitals that were not really involved in the NJ response declined to participate. In the limited time available for community interviews, the team was able to complete interviews at 58% of the households where contact was made.
    - Analysis:
        - Descriptive analysis
        - Logistic regression analysis; data was weighted to account for unequal probability of selection at the levels of area, census block, and household
        - Town members who lived adjacent to the evacuation zones had questioned whether or not they should have been evacuated also. In order to help the state answer this concern, bivariate analysis was conducted using experiencing symptoms as the outcome measure. Evacuation, zone, distance from the site of the derailment, and smelling an odor were evaluated.

- Outcome:
    - Discovered deficiencies in communication with the residents about potential health effects and how to shelter-in-place and that the regional medical coordination center was not utilized. Communicated this with the state health department so that they can work with the local responders to improve future responses to chemical incidents.
    - Reported clinical presentations of patients treated at area hospitals after the incident and the health status of interviewees to the state health department. They used this information in helping determine their ongoing public health response.

- Chemical contamination of river that supplied drinking water to a nine-county area, West Virginia, 2014
    - Requesting agency: West Virginia Bureau for Public Health
    - Data Collected:
        - Reviewed medical charts of patients whose hospital visits were potentially related to the water
        - Surveyed hospitals that treated patients for the incident to understand their inclusion criteria, learn about the surge, and how those hospitals under the "Do Not Use" the water order coped with the situation
    - Sampling: Not applicable. All 584 charts were abstracted because there was enough staff to do the abstractions in less than 2 weeks.
    - Response rate: Interviewed staff at the 10 hospitals (100%) that reported treating patients for complaints the patients felt were related to contaminated water
    - Analysis:
        - Descriptive analysis
        - Many infectious conditions such as influenza were present in persons seeking medical care. In addition, the population was being told not to use the water to wash their hands, which is important in preventing disease transmission. To evaluate if the symptoms being seen could possibly have been related to the chemical, associations between route of exposure (oral, dermal, respiratory) and symptoms (gastrointestinal, dermal, respiratory) were examined by using chi-square analysis.
    - Outcome:
        - Provided the state health department with accurate counts of persons that sought hospital emergency department care for complaints they felt were related to the water whose symptoms were not explained by another diagnosis and described the symptoms these patients experienced. The health department used this information to develop public health messaging.
        - Identified that hospitals were not using consistent criteria in reporting patients seeking care for conditions that could be related to the contaminated water. The state health department is developing a "go" kit with educational materials designed to ensure consistent case reporting during public health emergencies.