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EDMUND G. BROWN JR.
Governor

December 12, 2012

Janine Chicourrat
General Manager
Portola Hotel and Spa
2 Portola Plaza
Monterey, CA 93940

Dear Ms. Chicourrat:

The California Department of Public Health (CDPH), Occupational Health Branch (OHB), is writing to provide you with the results from our investigation of the chlorine release that occurred on February 13, 2012, at the Portola Hotel and Spa.

CDPH/OHB is mandated to investigate the public health effects of chemicals in the workplace, and to make recommendations to prevent occupational illness and injury (California Health and Safety Code 105175-105180). Our Emergency Preparedness Team (EPT) conducts public health investigations to better understand the workplace and community impacts from exposure to chemicals and other hazards, and to identify methods to reduce similar incidents from occurring in the future.

In summary, we think that the key areas for change at the Portola Hotel and Spa are to reduce exposure and to improve understanding of chemicals used in the workplace. Our specific recommendations follow.

Background

On the morning of February 13, 2012, CDPH received a Hazardous Materials Spill Report (HMSR) from the California Emergency Management Agency regarding a chemical release at the Portola Hotel and Spa in Monterey. According to the HMSR, an employee had mixed bleach with an unknown chemical. Nine employees were transported to local hospitals, and 210 guests were evacuated from the hotel. As the incident progressed, 21 additional employees experienced symptoms and were transported to local hospitals. Emergency responders determined that chlorine gas had been released in the hotel's laundry facility from the mixing of two incompatible laundry products (Ecolab's Laundri Destainer and Tri-Star Sour VII).

EPT initiated an investigation of this incident in order to: 1) identify potential exposure-related health effects in affected employees; 2) analyze factors that may have contributed to this incident; and 3) develop recommendations to avoid similar incidents from occurring in the future. The investigation included interviews of those affected by the incident and other key informants including hotel managers, emergency responders, and other responding agencies. As part of the investigation, EPT conducted telephone interviews of some of the affected employees in the

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days following the incident and conducted a site visit on February 24, 2012. During this visit we met with a group of employees and managers to discuss the incident and our investigation, interviewed those affected by the incident as well key informants, and conducted a workplace walk-through.

Location Description

The Portola Hotel and Spa is located at 2 Portola Plaza, Monterey, California. The hotel has a complex layout consisting of 10 structures with some buildings having as many as seven floors. The ground floor is at varied levels and follows the natural terrain. The laundry facility, where the incident occurred, is located in what the hotel considers the basement, although the north end of that building exits onto a courtyard at street level. The hotel is bounded by Del Monte Avenue to the south, Pacific Street to the west, a courtyard with restaurants and museums to the north, and a parking structure to the west.

Incident Description

On February 13, 2012, at approximately 9:00 am, a member of the laundry staff poured 1-2 quarts of Laundri Destainer (concentrated chlorine bleach) into a 15-gallon drum of Tri-Star Sour VII (a mixture of fluorosilicic and citric acids), resulting in a release of chlorine gas. Both products are supplied by Ecolab. Upon mixing the two incompatible products, the laundry supervisor saw a cloud and smelled a strong odor, and she contacted the Hotel's Security Supervisor. According to hotel management, the Security Supervisor went to the laundry room, closed the door to prevent the migration of more gas, and called the General Manager. The General Manager instructed the Security Supervisor to call 911.

Employees reported that they prepared and picked up baskets in the laundry room soon after the incident and then continued to work in other parts of the hotel. The majority of the interviewed employees reported smelling strong odors after the incident; odors were reported to be present in the service elevator, in the corridor where the laundry room is located, and on the upper floors.

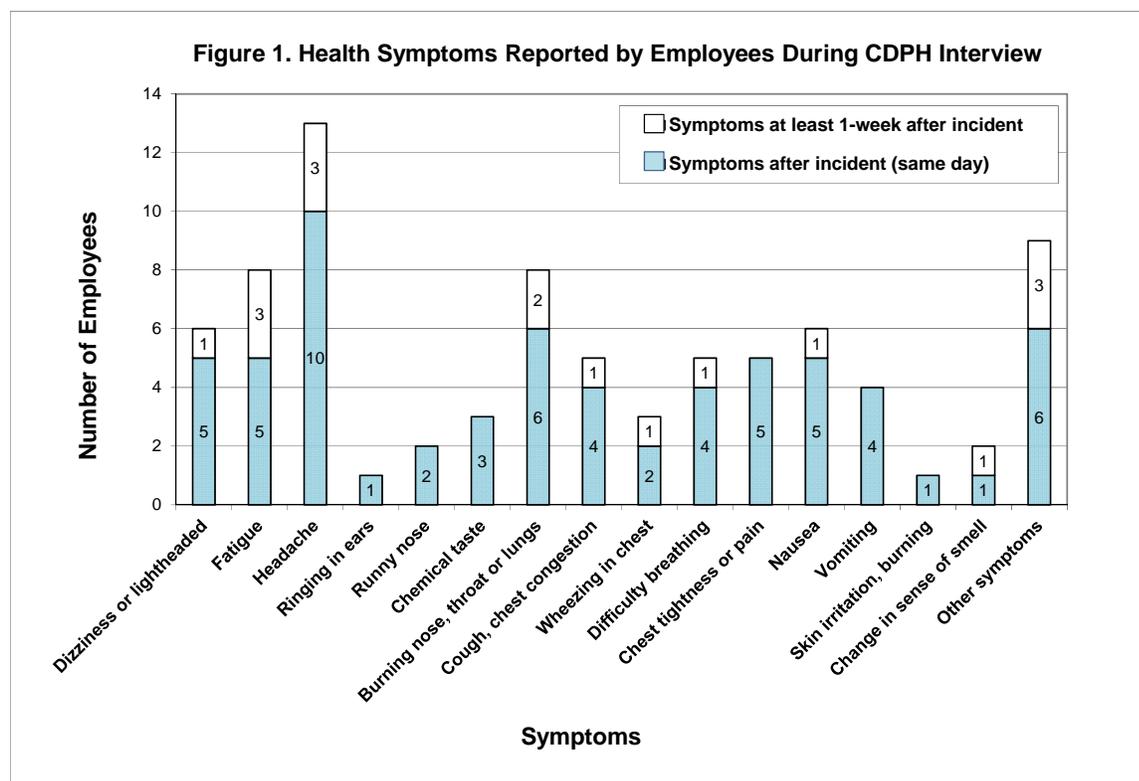
The Monterey Fire Department arrived on-scene at approximately 09:45 am and detected a chlorine odor on the third floor, prompting them to activate the fire alarm and order an evacuation of the entire hotel at 10:00 am. Employees report that they continued to work in buildings on the other side of the hotel property while the evacuation was taking place. After the evacuation was initiated, hotel staff went to each floor and checked every room to ensure all of the hotel guests were evacuated; a "tag out" system was used to mark each guest room after it was checked. The evacuated guests (210) and employees were directed to convene outdoors in the plaza meeting area. Initially, nine employees began experiencing symptoms, prompting the fire department to call for emergency medical support. Between approximately 10:00 am and 2:00 pm, a total of 30 employees were transported by ambulance to local hospitals.

At approximately 2:30 pm, the Monterey County Environmental Health Hazardous Materials (Hazmat) team used a gas meter to test for the presence of chlorine gas. They detected chlorine next to the sealed drum in the laundry room at 0.3 parts per million (ppm), but chlorine was not detected elsewhere in the laundry room or in the rest of the hotel (all floors were checked). The drum was removed from the premises by a hazardous materials disposal company. The evacuation order was rescinded by the fire department and the hotel was deemed suitable for occupancy by 3:00 pm.

Employee Exposure and Illness

It is not possible to quantify employee exposure, as chlorine was not measured in the laundry room around the time of the incident. It is possible that employees were also exposed to fluorosilicic acid, as it could have been liberated during the reaction and formation of chlorine gas. A total of 30 employees were transported to local hospitals for medical attention. Some employees felt ill immediately, and nine employees were transported to the hospital around 10:00 am by ambulance. Other employees experienced delayed symptoms occurring up to three hours after the release and were subsequently transported to the hospital.

We interviewed 13 exposed employees and three key informants, and reviewed medical records of 17 individuals who sought medical attention. The most common symptoms reported after the incident were: headache; burning nose, throat, or lungs; chest tightness; dizziness; fatigue; nausea; and vomiting. One hundred percent of the exposed employees interviewed reported that they had headaches; 38% of the employees interviewed experienced nausea and/or vomiting. Additional symptoms reported include cough, decreased appetite, stomach pain, tearing eyes, and stuffy nose. During the interview with CDPH staff (at least one week after the incident), several employees reported that they were still experiencing symptoms. A summary of the symptoms reported by one or more employees during the interview process are listed in the chart below (Figure 1).



The employee symptoms experienced are consistent with exposure to irritants such as chlorine and fluorosilicic acid. Table 1 below provides a summary of the health effects associated with inhalation exposure to chlorine and to fluorosilicic acid. The health effects caused by exposure to fluorosilicic acid are mainly due to hydrofluoric acid (HF), as most commercial fluorosilicic acid solutions contain HF as an impurity. It is most likely that the health effects experienced

were due to chlorine exposure, but it is possible that some of them were due to exposure to fluorosilicic acid.

Table 1: Acute Health Effects Associated with Inhalation of Chlorine or Fluorosilicic Acid	
Chlorine ¹⁻²	Fluorosilicic Acid ³⁻⁵
<ul style="list-style-type: none"> • Headache (5 ppm) • Burning of the eyes, nose, and throat (5-15 ppm) • Cough (30 ppm) • Chest pain/tightness (30 ppm) • Shortness of breath, difficulty breathing (30 ppm) • Pulmonary edema (fluid in the lungs) (40-60 ppm) • Nausea and vomiting (30 ppm) 	<ul style="list-style-type: none"> • Burning of the eyes, nose, and throat • Cough • Chest pain/tightness • Shortness of breath, difficulty breathing • Fluid in the lungs (pulmonary edema) • Hypocalcemia (reduced calcium levels) which can lead to tetany* (involuntary muscle contractions) and cardiac arrhythmias* (potentially lethal irregular heart rhythm)
ppm = parts per million * Concentration at which effects occur is unclear, though tetany and arrhythmias occur at higher concentrations.	

Long-term health effects, such as irritation of the nose and sinuses, asthma and other lung disorders, and mental health disorders can occur after short-term exposure to an irritant gas such as chlorine and fluorosilicic acid. In this case, we do not know if long-term health consequences have occurred, but this should be considered in individuals who are still symptomatic.^{5,6} Chronic low-level exposure to fluorosilicic acid may also result in mottling of teeth, joint stiffness, and weakening of bones (osteosclerosis).^{4,6} Based on our findings regarding the typical chemical handling practices at this facility, long-term, low-level exposure to both chlorine and fluorosilicic acid may be an issue for employees who work in the laundry facility (see “*Chemical Storage and Handling*,” below).

Discussion and Findings

Safety Training

CDPH was informed by hotel management that all employees receive OSHA Hazard Communication Training and are trained in how to handle cleaning products as part of new employee training and as an annual refresher. Employees who work in the laundry area also receive training on the laundry chemicals from Ecolab. CDPH staff requested and reviewed the training materials and logs. We received a copy of the training sign-in sheets (1/20/2012, 9/19/2011, and 11/14/2011) and the Hazard Communication training material (English only) used by the hotel. The Hazard Communication training used at the hotel is a generic tool available online through OSHA and includes a quiz to ensure that employees understand the material. The only documentation provided to CDPH relating to trainings provided by Ecolab was a training report dated 2/16/2012, the day after the incident; 10 staff attended the training.

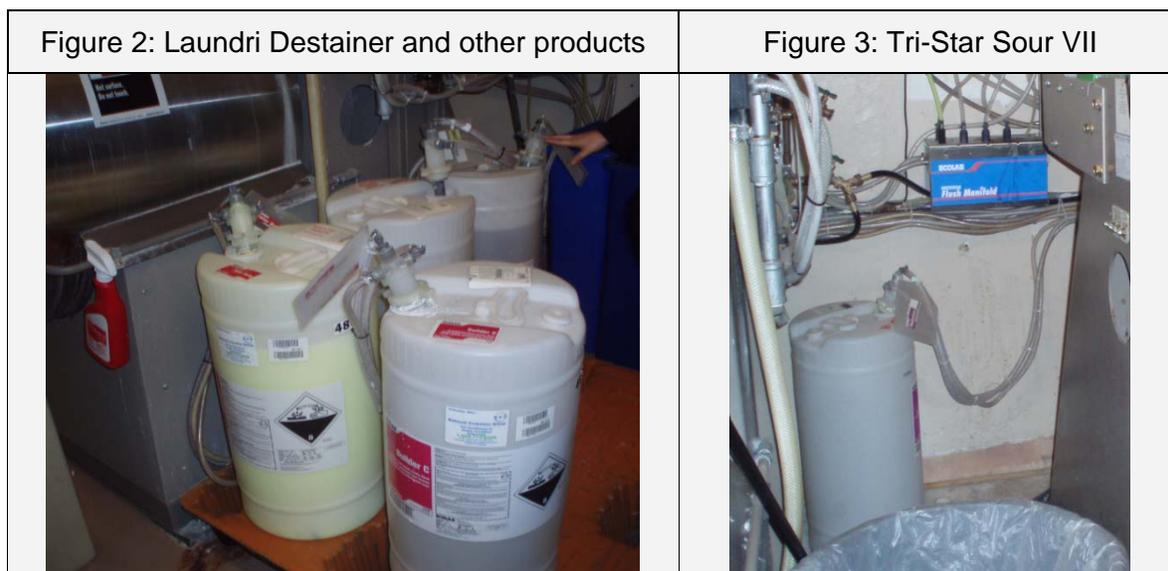
All of the interviewees reported having received training on chemical safety within the past five years; 46% reported having received one hour of training. Based on our interviews, it is our understanding that trainings for monolingual Spanish speakers are taught in English and then interpreted into Spanish by a bilingual employee. Of the employees we interviewed, 62% of

employees were unsure what caused the incident or how it could have been prevented, even after attending a meeting held by management soon after the incident.

Chemical Storage and Handling

At the time of the incident, the employee believed that she was mixing the same products together. Both of the products were labeled as “laundry detergent” and had similar warning labels located on the side of the drums. Because the drums were clustered together, it was difficult to see the warning labels on the sides as only the lid was visible. Since the incident, and prior to our site visit, the tops of the drums were labeled and incompatible products were physically separated in order to prevent future incidents.

During the site visit, CDPH staff observed that all of the laundry chemical containers were unsealed (Figures 2 and 3). The Material Safety Data Sheet (MSDS) for Laundri Destainer and Tri-Star Sour VII both state, “keep container tightly closed.”^{3,6} This warning is also stated on MSDSs for other laundry products used at the Hotel, Solar Brite and Turbo Boost.^{7,8} The reason for this recommendation is that vapors can escape from open containers and result in exposure. It was noted in the Ecolab training report (2/16/2012) that new “probes” were being ordered to secure the tops on the containers. CDPH staff did not interview the individual who is responsible for changing out the drums in the laundry, so we do not know if personal protective equipment (PPE) is used when the drums are handled. PPE is recommended for handling both chlorine and fluorosilic acid.^{3,7}



Conclusions and recommendations:

Conclusions

CDPH staff identified the following issues that may have contributed to the incident and the resulting health effects experienced by exposed employees:

1. Improper storage and handling of chemical drums/containers

The incident was partially a result of poor labeling and placement of chemical drums that contributed to the mixing of incompatible chemicals. This issue has already been

addressed. However, the containers remained unsealed and vapors can escape, potentially causing worker exposure.

2. Inadequate Hazard Communication and Emergency Response

Hotel employees did not realize that perceiving an odor in the hotel or experiencing symptoms indicated the presence of a potentially hazardous environment and that the building should be evacuated. Instead, a number of employees continued to work on other floors, where the gas ultimately migrated.

3. Inadequate Safety Training

Current training is inadequate for monolingual Spanish speakers, as the employees interviewed were not aware of how the incident occurred or how it could have been prevented, even after having attending training after the incident. Employees also expressed a general lack of awareness about the hazards associated with the laundry chemicals.

Recommendations

The following recommendations represent best practices designed to help prevent worker exposures.

1. Reduce exposure

- a) Substitution of more toxic chemicals with less toxic chemicals is always one of the first steps to reducing worker exposure; consider substituting a less toxic chemical for fluorosilic acid.
- b) Limiting employee handling of chemicals also reduces the risk of mishandling and employee exposure; consider alternate forms of laundry processing that will reduce the number of employees who handle chemicals. For instance, have EcoLab employees deliver and hook up chemicals rather than having hotel employees move and hook up chemicals.

2. Improve understanding of chemicals in the workplace

- a) Conduct health and safety training in both English and Spanish and translate training materials into Spanish in order to better meet the requirement that occupational health and safety information be communicated by management in a "form that is readily understandable by all employees," as is outlined in the existing Injury and Illness Prevention Program. The training should be taught in Spanish by an individual who understands the information. Hotel management should ensure that employees understand these trainings and document completion of the training.
- b) In the Hazard Communication training, train employees to understand that smelling a chemical odor and/or experiencing symptoms, such as coughing or difficulty breathing, are warning signs of a potentially toxic exposure and they should leave the building immediately and find fresh air. Train supervisors to encourage employees to leave the building under these circumstances.
- c) Ensure that employees are trained adequately and use the appropriate PPE, as specified on the MSDS, when coming into contact with fluorosilicic acid and other chemicals used at the Hotel.
- d) Make the MSDSs for all chemicals used in all areas of the hotel available to employees, in both English and Spanish.

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We hope the background information provides insights as to what went wrong and that these recommendations will help prevent similar incidents from occurring. We are also developing a hazard alert about this type of problem that we plan to distribute to hotels throughout California. We will share this hazard alert with you so that you can provide comments before it is final. CDPH appreciates Portola Hotel and Spa's cooperation during this investigation.

If you have any questions please feel free to contact Tracy Barreau at (510) 620-5760 or Rachel Roisman at (510) 620-3606.

Sincerely,

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