

# **Chemical Sciences Division**

**Fiscal Year 2015**

**Environmental Health and Safety**

**Self-Assessment Report**

## **Earthquake Preparedness**

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## Executive Summary

This Environmental Health and Safety Self Assessment evaluated how prepared the Chemical Sciences Division is for the eventuality of a major earthquake. The assessment team identified all large equipment and arranged for its bracing, and identified heavy or awkward items on high shelves. These latter items were relocated or braced so they would not dislodge during an earthquake. Before and after pictures are shown in the results section. The team also surveyed the division's LBNL personnel for their level of preparedness at both work and at home. The survey consist of questions regarding home and work disaster supplies, knowledge of available communication resources, workplace and home disaster planning, and ability to continue LBNL business after an event.

- About 60 % of the persons surveyed knew their evacuation route from both laboratory and office with an alternate route.
- Supervisors had most of their employees contact numbers, but few had all employee contact numbers.
- About 50 % of division personnel were signed up for Lab Alert.
- Greater than 75% of the division personnel stated that they had three or more days of food and water at home, but about 25 % had food and water at work.
- All persons surveyed had some form of data backup that could be accessed remotely.
- All respondents stated they have sufficient work to continue LBNL business from remote location.
- 50 % of the persons questioned had plans with loved ones out of state to facilitate communication.

We encourage maintenance of a kit containing food, water, and associated disaster supplies by handing out a suggested list of emergency items (appendix 1) during these survey meetings. Additionally, we made this information available on our division website. To support working from home after an event, we handed out a flyer (appendix 2) with instructions on connecting to the LBNL servers from home. Moreover, we discovered a handout (appendix 3) that is used by one of our PIs to train his new workers about earthquake safety, and we disseminated this as a handout during these survey meetings as well.

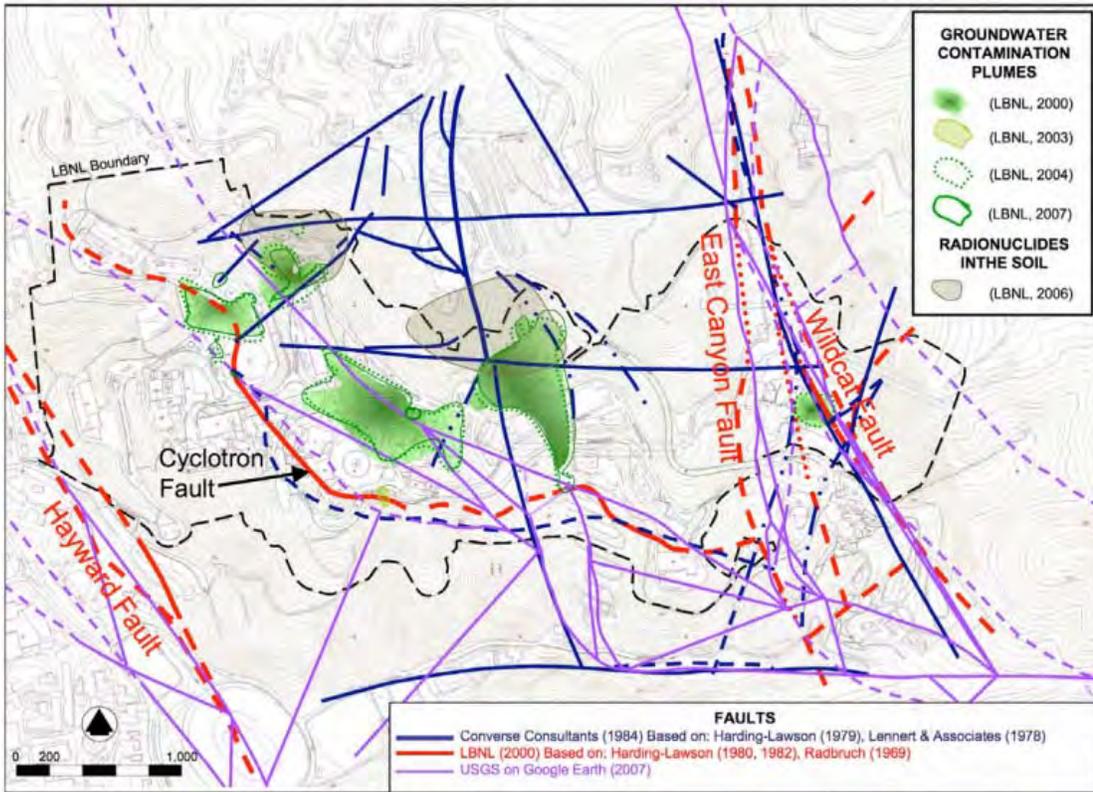
## Introduction

Environment, Health, and Safety (EHS) Self-Assessment is a process of continuously evaluating safety program effectiveness. The major goal of the EHS self-assessment process is monitoring the effectiveness of Divisional Integrated Safety Management (ISM). The self-assessment process provides feedback which results in improved work processes and safety programs. Each year, the LBNL Chemical Sciences Division (CSD) performs a formal self-assessment of our safety program performance and for 2015 we have selected to evaluate our preparedness to withstand and recover from a major earthquake.

The Hayward Fault runs directly along the western boundary of Lawrence Berkeley National Laboratory, and the smaller Cyclotron, East Canyon, and Wildcat faults run through the Laboratory grounds (figure 1). Therefore, it is a certainty that the laboratory will experience minor earthquakes, and a much larger earthquake being a possibility in the near future. We wanted to evaluate the level of preparedness of the division with

respect to equipment bracing, and personnel knowledge in order to maintain the safety of personnel during an event, and to better respond to employee needs after an event.

Figure 1: Fault zones in relation to Lawrence Berkeley National Lab



## Assessment Methodology

An assessment team was created that consisted of Adam Bradford, Chemical Sciences Space Coordinator and Building Manager, Catherine Mendez, Safety Administrative Assistant and Martin Neitzel, Chemical Sciences Division Safety Coordinator.

There are two main parts to this division self assessment.

1. The assessment team identified all large equipment and arranged for its bracing, and identified heavy or awkward items on high shelves. These latter items were relocated or braced so they would not dislodge during an earthquake. Representative before and after examples are shown in the results section.
2. The team also surveyed the division's LBNL personnel for their level of preparedness at both work and at home. The survey is included in the Assessment Results section of this report. The survey consists of questions regarding home and work disaster supplies, knowledge of available communication resources, workplace and home disaster planning, and ability to continue LBNL business after an event.

## Assessment Results

### Part 1: Earthquake Bracing

The following findings were collected as a result of interviews and inspection of laboratory areas. All attempts were made to fix each issue that was identified, and for the majority of the divisional findings this was accomplished.

Several refrigerators were discovered with improper earthquake bracing. Several brace points were found with bolts not tightened and in two cases the pressure plates had pulled loose. Work requests were placed to have these issues fixed.

Figure 2: Earthquake bracing not secured or the pressure plates coming loose.



Several areas in the division were identified where items were sitting on shelving lips. Figure 3 shows representative examples of this issue. The lips are to keep the items from falling during an earthquake, but if the items are not behind the lips, the lips cannot hold the items on the shelf. Items of this type were adjusted to sit behind the lips of the shelf or moved to other locations.

Figure 3: Items hanging over lips of shelves.



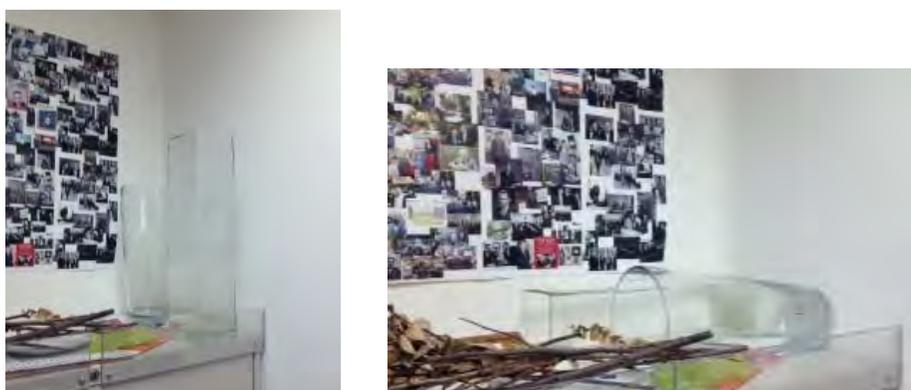
Some shelving units have doors to keep items from falling during an earthquake. Several areas were found with shelving doors open (see Figure 4). These doors were closed and area leads were asked to better monitor areas for this hazard. Over the course of the assessment, these areas were monitored for this issue and compliance was much improved.

Figure 4: Open shelving.



Office areas can have the same hazard of falling items. Figure 5 shows a file cabinet with tall glass vases that could easily fall during an earthquake. This file cabinet however has a great big acrylic lip to prevent items from falling, so these vases were laid down to lessen the likelihood that they could fall.

Figure 5: Vases on top of shelf.



The offices shown in figure 6 have tall shelving units that were discovered unattached to the wall. Work requests were entered to attach these shelving units and housekeeping was requested of the researchers as well.

Figure 6: Office shelving not seismically braced.



While the sustainability bins are a great avenue for the eco-conscious to do their part (figure 7), the placement of these bins are usually in major corridors and often times in the line of egress. These bins can be knocked down by someone trying to evacuate or from a strong jolt from an earthquake. The bins are not secured and can not only block egress by turning over, but the contents can fall out and create slip, trip and fall hazards. As of this date, the bins remain unsecured, but we will continue to explore inexpensive options with Facilities and EHS to secure the bins.

Figure 7: Sustainability Bins.



Figure 8 shows a very large, heavy and unsecured cabinet that is in the hallway of Building 2. In an earthquake this item would certainly block egress. This cabinet was not owned by CSD personnel, so we contacted the Building 2 manager and the cabinet was removed from the hallway.

Figure 8: Large cabinet in Building 2.



Heavy equipment that is located on high shelves need to be strapped to prevent them from falling during an earthquake. The equipment shown in figure 9 is sitting on a shelf that was not constructed with a lip to hold items onto the shelf. After the inspection, nylon straps were added to the shelf to secure the equipment from falling.

Figure 9: Heavy equipment needing strapped on shelf.



## **Part 2: Preparedness of Division Personnel**

Approximately 20% of the LBNL Chemical Sciences Division personnel were surveyed regarding their earthquake preparedness using the questionnaire below. Discussions ensued and much useful information was conveyed.

### **Self Assessment Inspection and Interview Procedure**

#### **A. Earthquake Preparedness Inspection:**

1. Check for large equipment the needs bracing.
2. Check for heavy items or large awkward items that are on high shelves.
3. Check for items that are on wheels that are not locked or chocked.
4. Check for items, even if small, that could obstruct egress after an earthquake.

#### **B. Earthquake Preparedness Lines of Inquiry:**

1. What is your building evacuation plan?
2. Where is your building assembly area?
3. Does your supervisor have your home or cell telephone number?
4. Are you signed up for Lab Alert?
5. Do you keep any emergency food and supplies at work?
6. What emergency supplies do you have at home, e.g. food, water, first aid kit, radio, clothing, blankets, etc.?
7. Do you live far from work and if so do you have a plan for getting home?
8. Do you have a plan for contacting your family after a disaster?
9. If an earthquake were to happen right now, could you work from home until it was deemed safe to reenter buildings?
10. When you work from home, do you remote into your LBNL desktop or VPN into LBNL server or some other group server?
11. Are your LBNL files backed-up, Carbonite or other back-up service?
12. Do you do a manual back-up?

## Results of Survey:

About 60 % of the persons surveyed knew their evacuation route from both laboratory and office, and also had a back-up route to the assembly area. At these meetings, possibilities were discussed and routes were selected.

Supervisors had most of their employees contact numbers, but few had all employee contact numbers. Also, these supervisors did not know the reason why it was important to have all of these numbers. That is, our division emergency phone tree goes to the PI level. The division relies upon the supervisors for the final personnel contact. Assurances were received that supervisors would obtain and maintain contact lists of their workers.

About 50 % of division personnel were signed up for Lab Alert. Some who were signed up stated that they were not sure if it was working because they have never gotten a message. They were informed that this is quite possibly because we have not had an event large enough to warrant sending out this high level message service. Martin Neitzel contacted LBNL Emergency Management, confirmed that this was the case, and was sent a test email and text to confirm that the system was working.

Most (>75%) of the division personnel stated that they had three or more days of food and water at home but about 25 % had food and water at work. This is not surprising as the lab has supplied food and water in the disaster boxes that are situated around the hill, and we do have the water in the coolers, and food at the cafeteria. Moreover, Emergency Management stated to Martin Neitzel that in the event of a major earthquake, personnel would be sent home, as there are insufficient resources to accommodate everyone on site for long periods and personnel would not be able to reenter buildings until after each building was surveyed by a structural engineer. A handout was distributed with suggested items for a home disaster kit to facilitate employees building a home kit, (see Appendix 1).

All persons surveyed had some form of data backup that could be accessed from home or some other remote office location. The merits of these different types of backup storage were discussed and a handout on accessing the LBNL servers was presented and is also available on the Chemical Sciences website, (see Appendix 2). Moreover, all respondents confirmed that they have sufficient work that could be done remotely, so LBNL business could continue.

Some time was spent discussing best practices for contacting family after the event. About half of the persons questioned had set up plans with loved ones out of state to facilitate communication between persons in the affected area. Also, the merits of using text instead of voice to communicate were discussed as text use less bandwidth to send and are more reliable communication when the systems are overloaded.

## **Conclusion**

Environment, Health, and Safety Self-Assessment is a process of continuously evaluating safety program effectiveness. The assessment team (Adam Bradford, Catherine Mendez, and Martin Neitzel) identified all large equipment and arranged for its bracing, and identified heavy or awkward items on high shelves. These latter items were relocated or braced so they would not dislodge during an earthquake. The team also surveyed the division's LBNL personnel for their level of preparedness at both work and at home. We encourage maintenance of a kit containing food, water, and associated disaster supplies by handing out a suggested list of emergency items (appendix 1) during these survey meetings. Additionally, we made this information available on our division website. We also polled employees to see how many persons in the division could work from home in the aftermath of a major earthquake. To support working from home after an event, we handed out a flyer (appendix 2) with instructions on connecting to the LBNL servers from home. We questioned personnel about their use of the division supported back-up service Carbonite. Moreover, we discovered a handout (appendix 3) that is used by one of our PIs to train his new workers about earthquake safety, and we disseminated this as a handout during these survey meetings as well.

## Appendix 1:

### Staff Preparedness Tools

Protective Services and Divisions/Departments can assist personnel to prepare for a continuity event in advance. Protective Services and Divisions/Departments should dispense personal and family preparedness information, and this information can be found here, <http://www.lbl.gov/ehs/ep/>. The Chemical Sciences Division recommends that personnel create and maintain emergency kits. These emergency supply kits may contain the following items:

#### SAMPLE: Emergency Kit

- Light source or flashlight with batteries
- Whistle
- Radio (solar/battery/crank operated)
- Notepad/pen/marker
- Water and food
- Medical needs
  - Prescriptions or personal medications
  - Extra pair of glasses, contact lenses, or hearing aids
  - Personal care and hygiene items
  - List of allergies/blood type
  - Hearing aids and batteries
  - Insurance information
- Walking shoes, jacket, hat, change of clothes
- Emergency blanket, sleeping bag
- Cash (small bills and coins) and credit cards
- Duct tape
- Garbage bags
- First aid kit
- Identification papers, contact lists, resources list
- Computer and backup computer battery
- Communication equipment (cell phone with backup battery)

## Appendix 2:

### **Accessing Grouper files through VPN.**

The first thing you need to do is log into the LBNL network through the VPN network. Use Cisco AnyConnect and enter your LDAP username and password. This program can be downloaded from the LBNL IT software download page.

In All Programs, go to Accessories and choose Run.

In the run box enter \\Grouper.lbl.gov\Home5. That is assuming you are set up in Grouper 5. IT will let you know what Grouper file you are set up in when they set up your Grouper account.

Click OK

It sometimes takes several minutes for the network password box to come up and there is no indication that anything is happening. You just need to sit back and be patient.

Enter Network Password:

Username is lbl.gov\mlneitzel, for me, you will have to replace the last part with your info.

Password is the password that you use to log into your PC at work. Most people use their LDAP password.

## Appendix 3:

### EARTHQUAKE SAFETY PROCEDURES



#### **Introduction**

It is not possible to prevent earthquakes or change the likelihood of an earthquake occurring. However, we can greatly increase our chances of safety and survival, by being aware and prepared. Since knowledge and preparation are keys to your survival during and after an earthquake, you should take steps to become informed.

#### **Dangers Associated with Earthquakes**

- The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris or collapsing structures. Injuries are commonly caused by:
  - Partial building collapse, such as falling masonry, collapsing walls, falling ceiling plaster, etc.
  - Flying glass from broken windows.
  - Overturned bookcases, filing cabinets, fixtures, furniture, office machines and appliances.
  - Fires, broken gas lines, etc. These dangers may be aggravated by lack of water due to broken mains.
  - Fallen power lines.
  - Inappropriate actions resulting from panic.

#### **Earthquake Safety Guidelines**

- Remain Calm. Sound usually precedes earthquake motion by a split second. If you have developed the correct earthquake responses in your mind before a quake, this split second is enough time to activate your automatic reactions. If you stay calm, you will be better able to assess your situation. The rolling and roaring may terrify you, but unless something falls on you, the sensations probably won't hurt you. Try talking yourself through the violent motion phase. This will release stress and others may take courage and follow your reasoned restraint. Think through the consequences of any action you plan to take.
- If you are indoors, stay there. If you are in danger:
  - Get under a sturdy table, desk or bed.
  - Brace yourself in an inside corner away from windows.
  - Move to an inner wall or corridor. (A door frame or the structural frame or inner core of the building are its strongest points and least likely to collapse. They will also break the impact of any falling objects).
  - In an apartment building the safest place is by the central reinforced core of the building, which is usually located by the elevator well.
  - Choose shelter which will provide an airspace if it collapses. If your furniture shelter moves, stay under it and follow it around the apartment.
  - Watch for falling objects - plaster, bricks, light fixtures, pots and pans, etc.
  - Stay away from tall shelves, china cabinets and other furniture, which might slide or topple over.
  - Stay away from windows, sliding glass doors, mirrors.
  - Grab anything handy (blanket, pillow, tablecloth, newspapers, box, etc.) to shield your head and face from falling debris and splinting glass.
  - Don't be alarmed if the fire alarm or sprinklers go off.

- **Do Not Rush Outside.** Stay on the same floor that you are on. Stairways may be broken and exits jammed with people. Do not use elevators as the power for elevators may go out and leave you trapped. The greatest danger from falling debris is just outside doorways and close to outer walls. If for safety reasons you must leave the building, choose your exits as carefully as possible.
- If you are outside, stay there. Move away from the building, garage, walls, power poles and lampposts. Electric power lines are a serious hazard - stay away from fallen lines. If possible, proceed cautiously to an open area.
- If you are in a moving car, stop. Stop as quickly as safety permits in the best available space. Stay in your car. Don't stop where buildings can topple down on top of you. A car is an excellent shock absorber and will shake a lot on its springs during an earthquake, but it's a fairly safe shelter from which to assess your situation.
- **Avoid Fallen Power Lines.** The possibility of encountering fallen live wires is great during and after an earthquake. If you are on foot, make a wide path around the wires. If you are in the car and live wires have fallen across the car, remain where you are. Your car is usually well insulated and will protect you from electric shock. Never assume that downed power lines are dead.

### **After An Earthquake**

Within the First Several Minutes:

- **Remain Calm. Don't Panic.** Try to calm and reassure others. Stop and take time to think. Wait until all motion has stopped. Do not run down stairs or outdoors. Be prepared for additional shockwaves.
- Do not light matches, cigarettes or turn on electrical switches. Flashlights are one of the best light sources after a damaging earthquake. Proceed with extreme caution.
- Protect hands and feet from broken glass or debris. Keep head and face protected (hard-hat, blanket, tablecloth, etc.)
- Make a quick check for injuries or trapped people. Provide emergency first aid if needed. Do not try to move seriously injured persons unless they are in immediate danger from further injury.
- Turn off all appliances and office machines. Extinguish all open flames. Check power lines and cords. If problems exist in electrical lines or gas lines the mains should be shut off.
- It may be necessary to draw a moderate amount of cold water in bathtubs and sinks and other containers, in case service should be disrupted.



During the Next Several Hours:

- Do not operate electrical switches, appliances or open-flame equipment if gas leaks are suspected. Sparks or flames can ignite gas from broken lines causing an explosion.
- Tend further to injured or trapped persons. Try to get help if necessary. If a person is trapped and you can free him without injury to yourself, remove debris piece-by-piece starting with the top of the pile.
- Be prepared for aftershocks - they are weaker than the main shock but can cause additional damage and psychological trauma. Watch out for other possible dangers, which may follow an earthquake, such as fire, flood, landslide or TSUNAMI (tidal wave).
- Turn on a battery radio to receive disaster instructions. Use telephones only to report extreme emergency situations.
- Inspect your work area carefully for structural damage. Carefully open exit doors - they sometimes jam. The initial quake may damage the structure and an aftershock could knock down weakened walls. Use extreme caution when moving around in damaged areas - they may collapse without warning. Check to see that sewage lines are intact before flushing toilets.
- You should not try to get home until government authorities say it is safe, which will be when the worst fires are under control and the streets have been cleared. This may happen quickly or it may take longer (perhaps 72 hours or more). You should advise your family that in the event of a major earthquake you maybe retained at work. When possible notify your family about your well being.
- Don't go outside sightseeing. Keep streets clear for passage of emergency vehicles. Your presence might hamper rescue and other emergency operation

