San Francisco-Oakland Earthquake:

Mitigation:

The Bay Area had only 75 accelerometer sensors, which locate quakes and determine their intensity. The quake was predicted fairly well. The areas which suffered most were known to be at risk. The Cypress Viaduct was built using non-ductile reinforced concrete and was also built on marshland which underwent liquefaction during the shaking and completely collapsed. The Candlestick Park which had recently undergone a seismic strengthening project was a success and stood strong during the earthquake, sparing thousands of lives.

Preparedness:

San Francisco wasn’t prepared very well for the earthquake and didn’t do very much to prepare. There were several reasons that nothing was being done. One reason is that the responsibility kept being passed through different offices and posts. Also, financial burdens caused problems. In 1972, the state began a strengthening program, but following budget cuts, 5000 engineers were fired, and the scheme was halted. No seismic structure analysis was carried out and there was no state legislature to make buildings safer at the time.

Response:

On October 17, at 5:04 p.m. a magnitude 6.9 quake hit the San Francisco Bay region. It proved to be both a major test of area emergency management and a wake-up call about the region’s disaster preparedness efforts. The quake was centered near Loma Prieta Peak (approximately 60 miles south of San Francisco) in the Santa Cruz Mountains. The earthquake
lasted only 15 seconds, but sixty-seven people died as a result of the quake and more than 3,000 people were injured. San Francisco’s Marina district suffered extensive damage. Gas mains and pipes burst, sparking fires. A 1.25-mile segment of the two-level Cypress Street Viaduct along the Nimitz Freeway (Interstate 880) collapsed during the quake, resulting in 42 fatalities.

Another hard-hit area was Watsonville, located several miles from the quake’s epicenter. More than 30 percent of Watsonville’s downtown and 1 in 8 houses were destroyed. Since, local power supplies were cut, and the government emergency radio system had failed, People simply stayed at home, and isolated themselves. The national media was the best prepared and helped the most during the earthquake with educating the public with what was happening. Relief efforts for the “Bay Area” were mainly a national response. The National Guard helped people get off the streets and transported people across the bay area.

**Recovery:**

After the 15 second disaster, there were approximately 12,000 houses ruined and another 30,000 damaged. This was a severe problem for the city of San Francisco considering there was about 10,000 people left homeless and not enough room to house all of them. American Red Cross and the Federal Emergency Management Agency (FEMA) did a lot of work to help the city both immediately and long term. Many programs were also out there to help people with funding for their homes including the SBA loan program, the Minimum Home Repair grant, Additional Living Expenses, and the California Disaster Assistance Program (CALDAP). It is estimated that over the next four years following the event, CALDAP spent over $43 million in loans to homeowners. Watsonville, a town right next to San Francisco, lost nearly 800 homes which most were reconstructed within a year from private donations and the American Red
Cross. On top of huge loan programs, religious and volunteer groups worked non stop to care for the victims, including the Christian World Relief Committee and Habitat for Humanity.

Works Cited


San Francisco Earthquake (1989)

Impact:
- 12,000 homes destroyed
- 3,800 injured
- 69 dead
- 50 billion lost
- 10 billion in insurance
- Bay Bridge collapse

Mitigation:
- 75 accelerator rivers on Bay
- No building standards
- Budget cuts prevented preparation

Preparedness:
- Transfer of responsibility
- Media helped quick people
- National Guard transported people away
- PG&E helped
- DRV

Response:
- Damaged money for rebuilding repair
- PG&E to help
- FEMA
- CA OGP
- American Red Cross

Recovery:
- PG&E
- NHC
- Small businesses

San Andreas Fault
- 1989
- 7.1 Richter

Concept Map:
Chernobyl Disaster:

Mitigation:

The Chernobyl accident happened in the year 1986 and ironically was caused by one of its mitigation efforts. Reactor 4 was being put under a test to see if the reactor could operate safely if there was loss of power. They had to make sure that without power to the turbines that the reactor could maintain a level that was cool enough to be safe. The idea of this test was to prevent a disaster if there was some sort of major loss of power. Due to inadequate training of operation workers the test was performed incorrectly. On top of this the reactor was not shutdown at the proper levels causing the reactor to explode.

Preparedness:

The Russian government was not prepared for a reactor failure of this size. However, immediate action was taken after the two explosions happened at Chernobyl. They were prepared with emergency feed pumps that dumped 200-300 tons of water per hour on the reactor for entire day. Also, around 5,000 tons of boron, sand, clay, and lead were dropped on the burning reactor to extinguish the flame and prevent anymore radioactive materials from being released into the atmosphere.

Response:

Not much could be done after reactor four blew in Pripyat. It took soviet authorities over a day to actually realize the scope of the damage that the radiation caused, and after the soviets did their investigation, there was an evacuation of all residents of Pripyat. Within three hours of the authorities calling for an evacuation, 50,000 people left the city, never to return. In the next seven months following the explosion, steps were taken to try and contain the radiation from continuing to spread. Response teams attempted to decontaminate affected areas as best they
could, but it had little effect on the massive fallout. In order to contain the reactors radiation, there was a metal and concrete shelter put over reactor four. It took over 206 days to build this shelter that contained some of the radiation. After the radiation was contained from reactor four, reactors one, two, and three were all turned back on until December of 2000.

Recovery:

Current efforts to contain the radiation from chernobyl are taking steps in the right direction. There is a new shelter being built for reactor four that is meant to be more permanent and to contain much more if not all of the radiation. The radiation also has had a major effect on human health in the surrounding areas. Emergency workers who helped in the containment process have been diagnosed with acute radiation poisoning and many other diseases, mostly different cancers. In the surrounding towns of Pripyat, there was a spike in cancer patients. Even still the areas around Chernobyl have some of the highest cases of cancer in the world due to the lingering radiation. Currently it is safe enough to go back into Pripyat, but only for small amounts at a time. Long term exposure could cause radiation poisoning. Much was learned from this accident in Chernobyl. Currently in the U.S.A, the nuclear reactors that are in operation are all encased in concrete shelters so if there were to be another explosion, it would be contained and not spread across the country like Chernobyl.

Works Cited


**Process Flow Diagram:**

1. Reactor four put under test to check to see if reactor could remain active with loss of power
   - Safety systems shut off to not interfere with reactor
2. Reactor powered down to 25%
   - Power actually fell to below 1%
3. Emergency shutdown failed
   - Massive spike in nuclear power
   - Control rods removed
4. Massive explosion occurred
   - Sealing cap blown off building, reactor rods melted, graphite caught on fire and was thrown into praking lot
5. Graphite burned for nine days
   - Soviet officers assess damage and order evacuation
6. Permanent shelter being built, hopeful installation in 2017
   - Shelter built around reactor for containment