Handout 6.2: Homework Assignment

1. Review the attached summary (see 1. on the following page) of a presentation by Dr. Charles Thiele to the National Research Council in which he states his opinion on the vital importance of building constituents to effect change. Dr. Thiel formerly has worked with federal agencies in Washington and was involved in the establishment of the NEHRP program. Based on the summary, what do you feel are the major points he made? Specifically, how can his ideas and lessons be used to make you a more effective emergency manager?

   Suppose you are a hazard manager (primarily focusing on earthquakes) working for: a) a state agency located in California; b) a local government agency located in California; c) a state agency located in a seismically active region of the eastern US; or, d) a local government agency located in a seismically active region of the eastern US.

   For each scenario above, provide specific examples of reasons why building constituents would be especially important for your job as a hazard manager. Who would potential constituents be for each scenario? Provide some examples of how you might attempt to build your base of constituents for each situation.

2. Review the attached reading assignment on earthquake prediction (see 2. on pages 4 and 5). Based on this article, do you feel we will ever be able to predict earthquakes within a few days or hours? Should the earthquake engineering community maintain monitoring activities at the Parkfield site even at the expense of many other potential research projects? Why or why not? For how long should monitoring be performed there?

3. Find a current article that chronicles current earthquake research that you feel is important for the reduction of earthquake hazard. The article must be at least five pages long and written within the last 10 years. Based on this article, prepare a one-page informative abstract that summarizes this project and why it is important for earthquake hazard reduction. (Note that an *informative* abstract contains important ideas and conclusions from the complete article. A *descriptive* abstract, on the other hand, simply states what the article is about in terms of its subject and scope). Be sure to properly cite your source(s).

1. Article/Presentation by Dr. Charles Thiele

Importance of Building Constituencies: – A History of the NEHRP Program

The following summary was adapted from a presentation by Dr. Charles Thiel to the National Research Council Committee to Develop a Long-Term Research Agenda for the Network for Earthquake Engineering Simulation (NEES), Board on Infrastructure and the Constructed Environment, Division on Engineering and Physical Sciences, National Research Council of the National Academies, April 25, 2002.

Steps for Securing and Maintaining Funding at the Federal Level:

- Define a program goal/objective that is not discipline or agency-specific.
- Develop constituencies or go into another line of work!
- Remember, in politics: "your victories are never consolidated, and your defeats are never final;" persistence over time pays!

Constituencies for a Federal Program:

- The agency itself (i.e., USGS, NSF, FEMA).
- The White House offices, particularly the Office of Management & Budget (OMB), and other agencies.
- Congress.
- Performers of the work that receive its funds (i.e., researchers).
- The beneficiaries of the work, that is, those who do not receive funding, but receive a benefit (i.e., the public).

If You Have:

- All **FIVE** constituencies, then you will have to argue for restraint.
- **FOUR** and you can have anything you propose, as long as it's not too far fetched.
- **THREE** constituencies you may incrementally grow faster than competing programs.
- **TWO** constituencies you may be able to hold on to what you have, if you work hard and do not give your opponents an easy target.
- If **ONE** is all you have, then you should look for another line of work, because this is a dead end!

Example: Consider Pre-NEHRP Earthquake Funding Situation:

- 1970 − one constituency (the performers), and it was not solid. Funding was very modest.
- 1973 − two reliable constituents.
- 1976 − four solid constituencies with the addition of the President's staff offices, and a fifth shaky constituent (agencies). Legislation then passed and NEHRP established, budgets rose to $80 million+ by 1978.

Further Comments on NEHRP:

- The rise of the earthquake program in the 1970s did not take place because it was natural and ordained.
- It happened by specific and concerted efforts.
- This earthquake program is unlikely to be maintained, much less return, unless and until the community:

  - Has a commonality of purpose
  - Develops and keeps the constituencies for the program; they are not there now!!

Final Comments:

- The 1989 and 1994 earthquakes had little net impact on funding, except for FEMA support of professional practice development. ***Earthquakes don't do the job for you!!***
- ***If*** the earthquake and hazards community:

  – Rediscovers the facts of political support for research and practice programs

  – Stops the competition for funds as the principal goal of the process

  – Rediscovers purpose of advancing the public's good (reduced construction expenditures, saved lives, mitigated damage and avoided catastrophes)

  – Realize that more cost-benefit research would provide more credibility

... then the future could be bright for earthquake research.

2. Student Reading Assignment for Homework:

A. Brief History of Earthquake Prediction.

The following is adapted from the US Geological Survey at the web addresses: http://quake.wr.usgs.gov/research/parkfield/eq_predict.html and http://earthquake.usgs.gov/faq/myths.html.

1. Ancient peoples had fanciful and superstitious explanations for earthquakes, usually involving something large and restless living beneath the earth's surface (i.e., giant snakes, turtles, catfish, etc.); they believed their movements created earthquakes.

2. Aristotle in BC times was one of the first to attempt an explanation of earthquakes based on natural phenomena. He postulated that winds within the earth whipped up the occasional shaking of the earth's surface.

3. Empirical observations of the effects of earthquakes were rare until 1750s when the 1755 Lisbon, Portugal Earthquake killed an estimated 70,000 people and leveled the city.

- This event marks *the beginning of the modern era of seismology*, prompting numerous studies into the effects, locations, and timing of earthquakes. Efforts often were spurred on by earthquake catastrophes.

4. In 1872, G. Gilbert studied the fault scarp from the 1872 Owens Valley, CA Earthquake and concluded that faults were a primary feature of earthquakes, not a secondary one. Until his time, most scientists people thought that earthquakes were the result of underground explosions and that faults were only a result of the explosion, not a primary feature of earthquakes.

5. In 1906, H. Reid studied the fault trace of 1906 San Francisco Earthquake and deduced that earthquakes were the result of the gradual buildup of stresses within the earth occurring over many years.

6. Until about mid-1980s, earthquake prediction research involved studying precursory phenomena thought to precede most, if not, all large earthquakes. Studies included examination of changes in magnetic field, wave velocities, tectonic deformation, resistivity, emission of gases, as well as clustering of many small earthquakes.

7. One well-known successful earthquake prediction was for the Haicheng, China earthquake of 1975, when an evacuation warning was issued the day before an M 7.3 earthquake. In the preceding months, changes in land elevation and ground water levels, widespread reports of peculiar animal behavior, and many foreshocks had led to a lower-level warning. An increase in foreshock activity triggered the evacuation warning. Unfortunately, most earthquakes do not have such obvious precursors. In spite of their success in 1975, there was no warning of the 1976 Tangshan earthquake, magnitude 7.6, which caused an estimated 250,000 fatalities.

8. Unfortunately, more recent work has not identified systematic, universal phenomena that occur before most large earthquakes. Again, a major problem is the paucity of large earthquakes that have been well instrumented and the complex nature of the problem.

B. Important Prediction Experiment – The Parkfield, CA Experiment**:**

The following information was adapted from: http://quake.wr.usgs.gov/research/parkfield/eq_predict.html

Parkfield, California is the site of an experiment to collect type of data needed for development of better prediction tools.

1. The "Parkfield Experiment" is considered to be the premiere earthquake prediction experiment in the world; Parkfield is a small community located along the San Andreas Fault in central California.

2. Earthquakes have occurred near Parkfield with uncanny regularity, with an average recurrence period of about 22 years: Earthquakes have occurred in 1857, 1881, 1901, 1922, 1934, and 1966 (see figure at end of section). It is considered likely that a magnitude 6 earthquake will occur near Parkfield very soon

3. There is evidence that small earthquakes and movement along the fault occurred in the days just before the last Parkfield Earthquake in 1966. Thus, Parkfield is an ideal location to set up instrumentation for the study of precursorary phenomena that might precede the next earthquake

4. Scientists from the U.S. Geological Survey (USGS) and the California Division of Mines and Geology (CDMG), along with colleagues from around the world, have installed sensitive instruments near Parkfield. These instruments are designed to detect changes in the earth that may occur a few hours or a few days before the next Parkfield Earthquake.

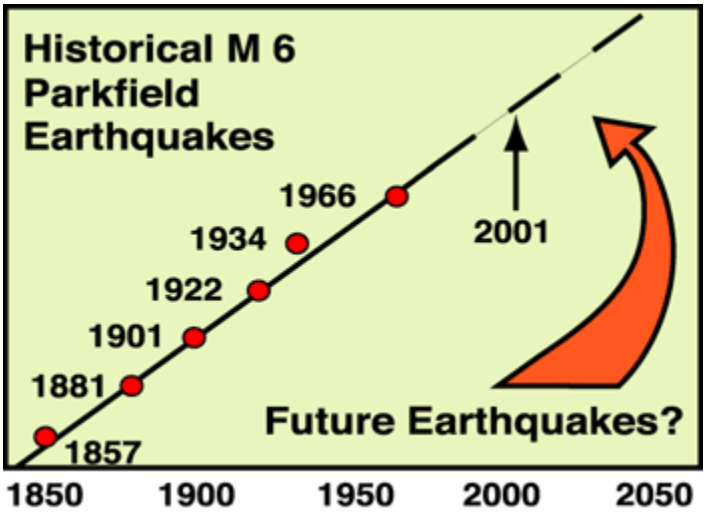

Figure 1: Plot showing systematic occurrence of magnitude 6 Parkfield Earthquake. The regular occurrence of this event makes Parkfield an ideal location to set up instruments that allow continuous monitoring in anticipation of another event in the near future. The objective is to detect precursory phenomena that precede the expected magnitude 6 earthquake that might prove useful in predicting other earthquakes elsewhere. Credit: USGS.