

## Frequently Asked Questions

The chief environmental concerns that are usually expressed about our surveys are as follows:

- 1) Will the shots trigger earthquakes?
- 2) Will the shots damage water supplies?
- 3) Will the shots damage man-made structures?
- 4) How far can the shots be felt?
- 5) What do the shots sound like?
- 6) Will the shots damage the landscape, archaeological resources, or endangered species of plants or animals?
- 7) Will activities generate dust?
- 8) Will roads be closed during your operations?

Answers to these questions are as follows. See also APPENDICES I and II of the Environmental Assessment.

1) *Will the shots trigger earthquakes?* *Our shots will not trigger earthquakes.* We have been performing this type of survey for more than 40 years, all over the world, in many different types of actively faulted areas, and with shots larger than those proposed for this project, and we have never triggered an earthquake. Our shots are similar in size to freeway-construction or mine blasts and pose no greater hazard to triggering of earthquakes than do those blasts. Furthermore, we detonate our charges near the Earth's surface, whereas the region where large earthquakes originate is generally 6 or more miles deep. Our signals are very weak by the time they reach that region. Finally, our largest shots will have a size equivalent to an M 2-2.5 earthquake. The Southern California region is shaken by an average of four M 2.5 earthquakes daily, and similar magnitudes are generated by mine and quarry blasts that occur nearly every workday of the year. We have examined 17,000 mine and quarry in southern California and have determined that none have triggered earthquakes. Thus, the hazard of our operation is not significant.

To our knowledge, *the only events that DO trigger earthquakes are major earthquakes, like the M 7.3 Landers earthquake of June 1992.* This event triggered a M 5.2 earthquake in southern Nevada and numerous smaller earthquakes at several volcanic areas in the western U.S., including Mammoth Lakes, CA, the Geysers, CA, and Yellowstone National Park. The Landers earthquake represents 10's of millions times the energy in our shots.

2) *Will the shots damage water supplies?* *Our shots will not harm water supplies.* We have performed water-quality tests before and after shots that were detonated directly in water to determine if there were any residual nitrate, nitrite, ammonia, or pH changes. The results were negative (see Appendix II of the Environmental Assessment). *The seismic charge is completely consumed during detonation.*

In our 30 years of experience, we have never damaged a spring or well, although we have shot within a few hundred feet of springs and wells. Except

for cases where a seismic charge is detonated directly in a spring or well, the only events that affect springs and wells are major earthquakes. (Major earthquakes apparently increase upper-crustal porosity, by shaking and opening cracks, and cause water tables to be lowered as the water drains downward.)

**3) Will the shots damage man-made structures?** *Our shots will not damage man-made structures. In siting our shotpoints, we use tables of ground velocity that we have established from years of shooting experience in order to ensure that we are below the lowest damage threshold for built structures (2 in/sec; Appendix I). That is not to say that our shots may not be felt (see 4 below).*

*Our shotpoints will not damage irrigation infrastructure in the agricultural areas. We have detonated test charges at varying distances (20-50 ft) from buried clay drain tiles (which we exposed for the tests), and there was no damage from these charges. (In fact, there was no ground disturbance at all). These tests were observed by an engineer from the Imperial Irrigation District.*

**4) How far can the shots be felt?** *Most shots can be felt only within a few hundred feet of the shotpoint.* The larger shots can be felt for a 1000 feet or possibly more. We have made an effort to keep the shotpoints well away from houses in order not to disturb people at night. Unfortunately, a few people may feel the shots. Prior to our LARSE surveys we communicated the purposes and effects of our activities to the public by way of city council meetings, radio, newspaper, and TV.

**5) What do the shots sound like?** *The shots usually sound like a dull "thud."* Occasionally, when steam is vented, a hiss will occur for a period of seconds following the shot.

**6) Will the shots damage the landscape, archaeological resources, or endangered species of plants or animals?** *Areas chosen for shotpoints are, to the extent possible, areas that have been affected by grading, dumping, or storage, such as road pull-outs, abandoned roads, dumps, and equipment or hay storage lots.* There are almost never archaeological resources near the shotpoints nor endangered species of plants and animals. If archaeological resources or endangered species of plants or animals are found within the footprints of the drilling operations, then the shotpoints are moved. The drilling operations affect an area approximately 50 by 50 feet. We leave each site in a condition as close to its original condition as possible. At perhaps 10% of our shots, there may be ground disturbance, including upward movement of casing or a small collapse crater around the shot hole, generally less than a few feet in size. If disturbance does occur, it develops immediately after the shots in almost all cases. We excavate the casing to at least 2 feet below the surface, cap it, and bury it. We fill in any craters with imported fill and recontour the ground surface to as nearly its original condition as possible. In a small percentage of our shots at bedrock sites (outside of the Imperial and Coachella Valleys), flyrock may be generated within about 100-200 ft or so of the shotpoint. This debris is cleaned up as necessary. The drilling and shooting operations at sites that are hand augered have a

minimal footprint of only a few square feet. Shots in these hand-augered holes rarely affect the surface.

7) *Will your activities generate dust?* *Our activities do not generate significant dust.* Drilling is done with water, and dust is not generated. The shots are contained underground, and detonation does not generate dust. In the cases where venting occurs during a shot, steam (not dust) is vented.

8) *Will roads be closed during your operations?* *Several shotpoints will be within 500 feet of paved roads, including Highway 74 (Peninsular Ranges), Thousand Palms Canyon Road (Indio Hills), and Highway 195 (Mecca Hills).* For safety, we will need to request and carryout temporary closures during shot detonations.