1 Question 6

What are the safety considerations related to (lack of) escape routes in the shafts?

The initial design includes a safety refuge at the far end of the excavation, two independent routes from the detector halls to the shaft, and two elevators in each shaft which are accessible from each of the independent paths.

The cost estimate was prepared by independent consultant, Don Hilton, who has extensive experience in the U.S. underground industry. The estimate was reviewed by a second independent consultant, W.D. Whightman, with similar industry experience, most notably as a manager of the contractor construction work at the DOE's Yacca Mountain facility.

There is no appropriate code for a project as unique as this. We intend to conduct a site specific code/safety review and have allocated funds from our September 2004 R&D grant proposal for this task.

2 Question 7

Does the cost quoted for civil engineering of shafts include all safety precautions for personnel working underground? A similar exercise for a shallower shaft at CERN was estimated at around $30M for a single shaft.

In our cost estimate study we have included all standard safety provisions consistent with U.S. normal practice and OSHA regulations. U.S. safety practices generally allow for a higher safety level than in most European and Asian countries.

Our geotechnical engineer, Chris Laughton, Ph.D., P.E., CENG., was the site engineer for the construction of 20 LEP shafts ranging in diameter from 5 to 20 meters. He considers our excavation methods and means, and shaft design, including safety provisions to be sufficient. Nevertheless, the code/safety review mentioned in the answer to Question 5 is essential.

While we are not familiar with the CERN exercise referenced, we would welcome any further information on this case study so that we can determine if it has any relevance to our situation.