Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

Mr. Frank Marcinowski, Director
Office of Radiation and Indoor Air
U.S. Environmental Protection Agency
401 M. Street, S. W.
Washington, DC 20460

Dear Mr. Marcinowski:

The purpose of this correspondence is to inform the Environmental Protection Agency (EPA) of four minor changes associated with the already approved Majorana Experiment. These changes include:

- a name change;
- the addition of two counting stations (detectors);
- the occupation of more of the existing physical space in the underground; and,
- an increase in liquid nitrogen consumption.

The name of the Majorana Experiment has been changed to the Segmented Enriched Germanium Assembly and the Multiple Element Germanium Array (SEGA and MEGA). The name change is proposed to emphasize the increase in functionality of the detectors from the original experiment while using the original infrastructure developed for Majorana.

The SEGA and MEGA experiment will have five counting stations, an increase of two from the three stations in the original Majorana configuration. The expanded function is still compatible with the original safety evaluation results for Majorana since the changes do not introduce new hazards, and the counting stations use the same type of equipment and the same infrastructure and resources. For example, the liquid nitrogen supply system (a 250 liter Dewar) is the same as in the original Majorana experiment.

The two additional sampling stations are added to provide an underground low level counting facility and to provide an additional germanium detector arrangement for Los Alamos National Laboratory (LANL) to investigate background rejection techniques from cosmic muons. The additional detectors will be used to assay the natural background coming from the components of the SEGA and MEGA experiment, study background noise reduction techniques to improve sensitivity, and count samples for national security purposes. While the new counting stations will use similar hardware to that associated with the Majorana neutrino experiment, they will be used for a different application. Examples of these different applications may include: counting soil to identify composition, counting lead to determine internal activity or investigating data acquisition algorithm modifications to reduce noise.

The addition of the new counting stations will increase the space required for the experiment and increase the daily liquid nitrogen consumption. These changes do not affect the original safety evaluation for Majorana.

Using the three detectors associated with astrophysics, the SEGA and MEGA collaboration is currently involved with prototyping the technologies required to make a large mass experiment as described in the original Majorana project description. SEGA and MEGA will use these three measurement systems to focus on key needs to count samples with extreme accuracy and demonstrate the technology. These include:

A. Triangle Universities Nuclear Laboratory - Institute for Theoretical and Experimental Physics (TUNL-ITEP) apparatus. This device can investigate the sources of major background in an eventual full-scale experiment by progressive commissioning of germanium and sodium iodide detectors. In addition, this apparatus may make double-beta decay measurements on modestly sized (about 15.9 cubic inches) samples of enriched material. Examples of the enriched materials are non radioactive isotopes of such elements as selenium, molybdenum, neodymium, cadmium and zirconium. These isotopes have a high cross section for double beta decay events. These materials would be introduced into the space between the two germanium detectors in the apparatus. Work with this apparatus is expected to last two to five years.

B. SEGA - This experimental apparatus consists of a single germanium detector inside a lead shield. The device is internally segmented into 12 parts, which can be independently monitored. This capability will allow the collaborators to evaluate the electronics supporting the detector and should validate pulse shape analysis, one of the cutting edge principles of the collaboration. Operation of the SEGA detector is expected to last approximately one to three years.

C. MEGA - This experimental apparatus will consist of eighteen germanium detector crystals. Sixteen of the crystals will be in an annular cryostat. The inner space of the annulus will be occupied by 0, 1, or 2 individual detectors similar to those used in SEGA. After appropriate development and testing, MEGA will run for a period of four to five years providing material assay with high accuracy using double-beta decay isotopes (similar to the TUNL-ITEP apparatus).

The revised experiment uses the same type of components as the original experiment, but will occupy roughly three times the physical space within the existing Q Room Alcove. The experiment will consume about 67 percent more liquid nitrogen daily (20 liters/day versus 12 liters/day) which is still an insufficient quantity to be an issue. The supply container of liquid nitrogen is the same size for both Majorana and SEGA & MEGA (250 liter Dewars).

Since the double beta decay experiment can be installed in the existing Q Room Alcove, no new excavation will be required for this experiment. All materials and equipment will be removed from the WIPP underground at the end of the experiment.

Based on the above information, the CBFO believes that the revised experiment will not affect either the long-term performance of the repository or our continued compliance with 40 CFR 191, Subpart A.

If you have additional questions regarding this matter, please contact Mr. Roger Nelson at (505) 234-7213.

Sincerely,

Inés Triay

Dr. Inés R. Triay
Manager

cc:
L. Smith, EM-23
B. Forinash, EPA-ORIA
C. Byrum, EPA-ORIA
N. Stone, EPA-Region VI
J. Bearzi, NMED
S. Zappe, NMED
M. Silva, EEG
C. Zvonar, CBFO
G. Basabilvazo, CBFO
B. Lilly, CBFO
R. Nelson, CBFO
J. Pigg, CBFO
J. Lee, WTS

CBFO:ORC:DM:VW:02-1355:UFC:5400

bcc:
D. Mercer, CBFO
R. Chavez, WTS
D. Hofer, WTS