

AbstractID: 13500 Title: Safety considerations concerning the scheduling of emergency off switch tests

Purpose: Some states require that emergency off systems (EOSs) of accelerators be tested at exactly three month intervals. However, EOS tests performed at three calendar month intervals, i.e., at any day of within the respective month when the test is due, would be more practical. In this work we compute the relative difference in safety by comparing the likelihood of patient injury due to a failed EOS in each of the two test schedules. **Method and Materials:** Based on over 120 machine years without failure of an EOS at our institution and an anecdotal report by an experienced service engineer who observed one failure during his 30+ years of work, we make the conservative assumption of an average of one EOS failure every 100 years. Similar considerations suggest one occasion every 100 years when the EOS is needed for patient safety. We use statistical methods to compute the expected time per year that an EOS is non-functional in each test schedule, and the expected likelihood of patient injury due to a failed EOS when it is needed. **Results:** Based on those assumptions, the EOS will be non-functional an average of 0.505 and 0.454 days when it is tested, respectively every three month and every three calendar month. The respective risk to patients is one event every 71,600 years and one every 79,500 years, corresponding to an 11% difference. **Conclusion:** We recommend that state regulations be changed so that EOS tests are required every third calendar month rather than at exact three month intervals. The increased risk to patients would be insignificant, while greatly reducing the physics/engineering resources required for the tests.