Column E explanation: October 21, 2014
1: Registration # 41-R-0022
2 and 3: 15 swine were used in this study

4: Explanation:
In November 13, 2013, 3 swine (SW- 3995, SW-3996, SW-3997) experienced unexpected deaths when their implanted medical devices most likely delivered cardiac therapy due to inappropriate programming. This was not a planned, protocol driven event. Implanted devices in animals are routinely disabled for therapy delivery when not actively being studied and therapy is administered only under full anesthesia. These devices were not disabled after a reprogramming study event and were able to deliver therapy to conscious animals. Cardiac therapy is known to be painful in humans; hence this is being reported as a Class E event.

The animals had been sedated during a data check on November 12, 2013 and the medical device software was reprogrammed. Most animals recovered normally, however one showed increased excitement behavior that was interpreted as anesthetic side effect or pain by the veterinarian. It improved after treatment with pain and anxiety relieving drugs. This animal and one other were found dead in the kennels the next morning. The last pig was observed to be normally active at 9:30 am (Nov 13), but was found dead at 10:00 am in the kennel. These were unwitnessed deaths. Necropsy showed no infectious or surgical related causes of death.

The devices normally function to deliver therapy when heart rates exceed a programmed level. It is possible the animals naturally went into a fatal tachycardia or fibrillation which triggered the therapy, in which case the animals would have been unconscious and unable to feel pain. However, if the therapy was triggered by normal sinus heart rates that exceeded the programmed level of the device, the animals would have been consciously aware of the therapy being delivered for a short time. Per normal device function, the entire delivery of therapy likely occurred in less than 3 minutes.

The research team identified the inappropriate programming the day the animals were discovered. The remaining implanted animals' devices were reprogrammed the same day into a setting that prevented therapy delivery. This successfully prevented the problem from occurring again.

The following actions were taken to prevent future occurrences of this type of event:

- IACUC met with the research team to determine the cause and prevention of such an event again.
- The research team has done a complete root cause analysis and determined prevention actions for future studies
- The research facility has revised their SOP to assure that implanted therapy devices will be unable to deliver therapy when they are not actively being studied. The study directors, facility management and veterinarians are trained on this SOP.
- The IACUC has reviewed and approved the facility SOP directing how therapy devices will be used in the research setting.