Background

Europe—especially France—has increasingly become the epicenter of terrorist activity in the West. With the attacks by the Islamic State of Iraq and the Levant (ISIL) in Paris, France is focused on state security. This focus extends to power generation structures of France, spread throughout the country. France derives much of its electricity from large nuclear power stations. In fact, France produces approximately 75% of its electric power from nuclear power generation. With so many nuclear reactors spread throughout France, there is a risk, although small, that a carefully coordinated terrorist attack using explosives could cause a nuclear meltdown at one of these plants. Such an attack would generate a human and environmental catastrophe that would last for decades. There are two general levels of effects—12 miles and 50 miles:

- 12 Mile—Radiation would render area uninhabitable
- 50 Mile—Radiation effects that would complicate life

This project focused on three key spatial questions:

- How much of the French population would be affected by a nuclear meltdown in the 12 and 50 mile zones?
- What stations would most affect key land cover types?
- What neighboring countries would be affected by a potential meltdown and how much of those countries would be within the zone of effects?

Methodology

The analysis involved two levels of buffers around individual nuclear stations. The buffer ranges were based on affected zone size of other models. I used three different variables: population affected, land cover affected, and other countries affected. I analyzed each power station by the three variables.

Population Affected in France: Calculated the number of people affected in each of the two zones—12 miles and 50 miles—using population data by municipalities in France.

Land Cover Affected: Calculated the square miles of affected land cover around each of the plants in both France and surrounding countries.

Other Countries Affected: Calculated the square miles affected in neighboring countries by individual station.

Conclusions

The results and key takeaways should be understood in context. This study did not evaluate how secure each of the French nuclear power stations is nor the chances of a meltdown if there was an attack on one of the stations. However, while the risk may be small, it is still important to understand where the vulnerability zones are around these stations and the potential impact on surrounding populations and environments in the event of a meltdown. The siting of most stations puts them away from major population centers—especially within the 12 mile zone that is most affected during a meltdown. Thus, the French should focus security specifically on the locations that could impact the most people or key parts of the surrounding environment. Additionally, neighboring countries should be working with the French government to ensure the security of stations on or near the borders because the effects of a meltdown would not stop at the border.