

Fukushima and the Indian Point Emergency Plan

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Indian Point Needs a Safer Emergency Plan

- With a safer Emergency Plan, even if there were a core melt accident at Indian Point, the expected health consequences would be:
 - From radiation:
 - Zero near term (early) fatalities
 - Zero near term (early) injuries
 - Long term effects that would be too small to be detectable statistically
 - From non-radiation causes:
 - Very limited because over-evacuation would be minimized

Choosing the Best Mix of Evacuation and Sheltering for Indian Point

- The best evacuation to sheltering mix is a **5%/95%** mix within the Emergency Planning Zone (EPZ) population, with later relocation from “hot spots”, even if they were beyond the 10 mile EPZ.
- The **5%** (~20,000 people) that would be evacuated would be from the innermost two miles and would be evacuated prior to the release of radioactive material. This action would **eliminate the early fatality and early injury risks. This was done at Fukushima.**
- Downwind areas in the EPZ would be ordered to shelter. It is unlikely that all of the remaining **95%** of the EPZ population would have to shelter. This sheltering, plus later relocation from hot spots, would limit long term effects to the point that they would be statistically **undetectable.** Sheltering and relocation from hot spots were done at Fukushima.

This Safer Emergency Plan is Based on Modern Science and Analyses of Fukushima Health Consequences

- Compared to earlier studies, modern severe nuclear accident studies developed at Sandia National Laboratories show that these very rare melt down events would (1) release **far less material** into the environment, (2) such releases would start **much later**, and (3) these releases would be far **more gradual**. All three of these general characteristics are beneficial and help shape safer emergency plans.
- The **Fukushima accident supports the major conclusions** reached by modern accident studies. **Releases of radioactive material at Fukushima were smaller, later, and more gradual than those predicted years ago in earlier Sandia accident studies.**
- The **World Health Organization** studied the health consequences of the Fukushima accident and concluded that there were **no early injuries or fatalities** and that long term effects, even when estimated very conservatively, would be **too small to be detectable** statistically.
- The National Academy of Sciences reported that no worker received a dose that resulted in acute radiation death or sickness.

Near Zero Radiological Health Consequences are Achievable at Indian Point and all other nuclear power plant sites.

- Achieving near zero radiological health effects at Indian Point should be straight forward because it is comparatively simple. It was done in Japan in spite of losing over 18,000 people to the earthquake and tsunami, loss of all electric power at the nuclear plants, flooding in lower plant areas, loss of most plant and off site instrumentation, severe losses in communication, hydrogen explosions, and the huge burden on general emergency workers to simultaneously deal with the worst earthquake ever to hit Japan, a tsunami much larger than people planned for, and multiple simultaneous melt downs. If near zero radiological health effects can be achieved under such extreme conditions in Japan, near zero radiological health effects can be achieved at Indian Point.

What Must be Avoided

- The Fukushima emergency response did not balance radiological and non-radiological risks. The response was already successful when it preemptively evacuated people from the innermost 3 kilometers and sheltered downwind. Far too many people were evacuated (150,000) and about **1600 fatalities** have occurred from the non-radiological risks of evacuation and subsequent sheltering in very crowded circumstances. Some, when told that it was now safe to return to their homes, refuse to do this out of continuing fears of radiation. This refusal to return to a home that is safe continued for years, with **80,000** people still sheltered **3 years after being evacuated**. Fear of radiation causes depression, anxiety, and post-traumatic symptoms and other health effects not attributable to the radiation itself.
- **OVER-EVACUATION MUST BE AVOIDED BY BALANCING RADIOLOGICAL AND NON-RADIOLOGICAL RISKS.**

Next Steps

- Convey the substance of this modern and safer emergency response to the public, their elected officials, regulatory bodies, and the media.

Discourage misinformation that could lead to over-evacuation, such as false statements about needing to evacuate out to 50 miles. There are about 20 million people within 50 miles of Indian Point. Suggesting that so many people might have to evacuate has no basis in science or actual accidents. It is about **1000 times too large** compared to the ~ 20 thousand pre-emptive evacuees within two miles of Indian Point. Such misinformation needlessly stresses people now, and could cause serious non-radiological harm in the unlikely event of an accident at Indian Point. Unfounded fear of radiation itself causes health effects and that should be cause enough to discourage issuing misinformation.

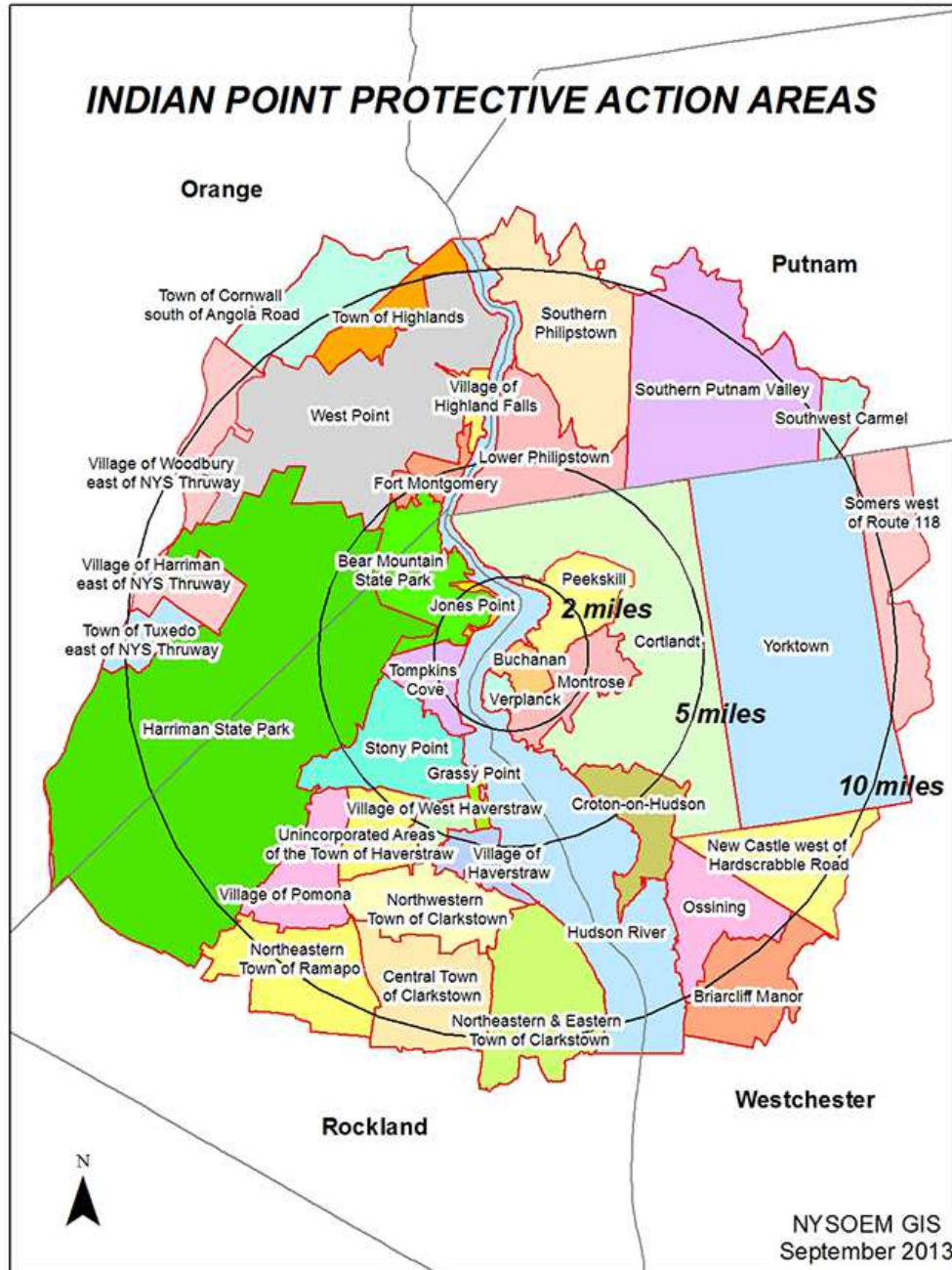
Detailed Information-1

- 1. If a General Emergency is declared at Indian Point, pre-emptively evacuate the innermost one mile (about 4000 people or about 1.2% of Indian Point EPZ population). Evacuees would be directed to a predesignated shelter(s). This step would virtually eliminate the early (acute) fatality risk.
- 2. If conditions deteriorate further or if no progress in two more hours, pre-emptively evacuate the 1 to 2 mile ring (about 15,600 people or about 4.2% of Indian point EPZ population). Evacuees would be directed to a predesignated shelter(s). This step would virtually eliminate the early (acute) injury risk.
- 3. If a release of radioactive material starts, order all people in the EPZ beyond the two mile evacuation zone east of the Hudson River to take shelter and to apply other protective actions. People west of the Hudson River should be ordered to shelter in those areas where elevated dose rates are measured. Recommend that downwind people beyond EPZ take shelter if elevated dose rates are measured. All should continue to listen to updates from news media.

Detailed Information-2

- 4. After release is effectively over, look for “hot spots”, even if they are beyond the 10 mile EPZ. Relocate people from these “hot spots” to predesignated shelter(s). Steps 1-4 would limit long term latent fatalities below a statistically detectable level.
- 5. End sheltering. This could be done county by county, depending on measured dose rates.
- 6. Monitor and control food ingestion pathways and water sources.
- 7. Return evacuees to their homes if dose rate levels warrant this.

INDIAN POINT PROTECTIVE ACTION AREAS



Measurements from Fukushima Support Modern Severe Accident Analyses.

% of reactor core inventory	Iodine	Cesium
1982 Sandia Report, SST-1	0.450	0.670
Fukushima (average of three plants)	0.017 -0.083 [Smaller than thought before]	0.009 -0.029 [Smaller than thought before]

N/A	Start of release after shutdown	Duration of release
1982 Sandia Report, SST-1	1.5 hours	Two hours
Fukushima	Earthquake on March 11, 2011 at about 15:00, releases start March 12, 2011, more than 12 hours later. [Later than thought before]	March 12, 2011 to March 25, 2011 [More gradual than thought before]

Fukushima Evacuation and Sheltering History

Time (in year 2011)	Distance from plant, Km.	Action
MARCH 11, 20:50,21:23	2,3	Two pre-emptive evacuations
March 12, 05:44	10	Compulsory evacuation
March 12, 18:25	20	Compulsory evacuation
March 15	20-30	Shelter in home
March 25	20-30	Self evacuation
April 22	Areas with dose rate > 20 mSv/year	Evacuation within one month
June 16	Hot spots with dose rate > 20mSv/year	Recommended for evacuation