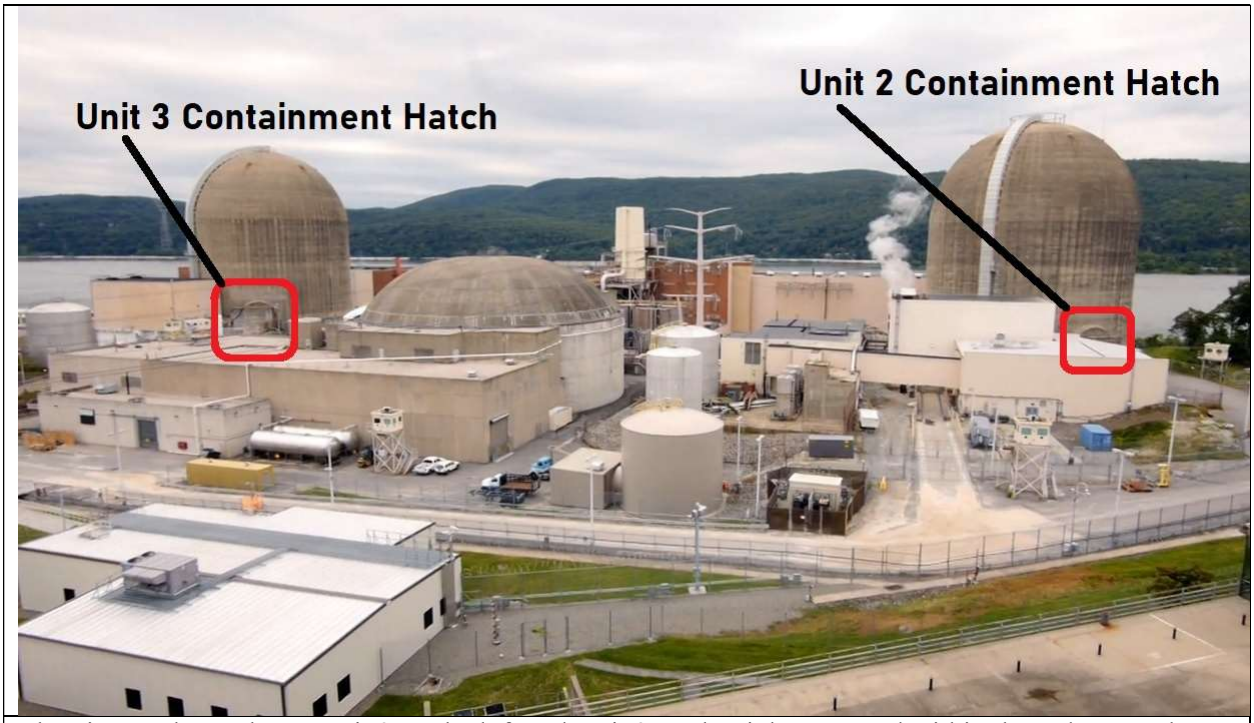
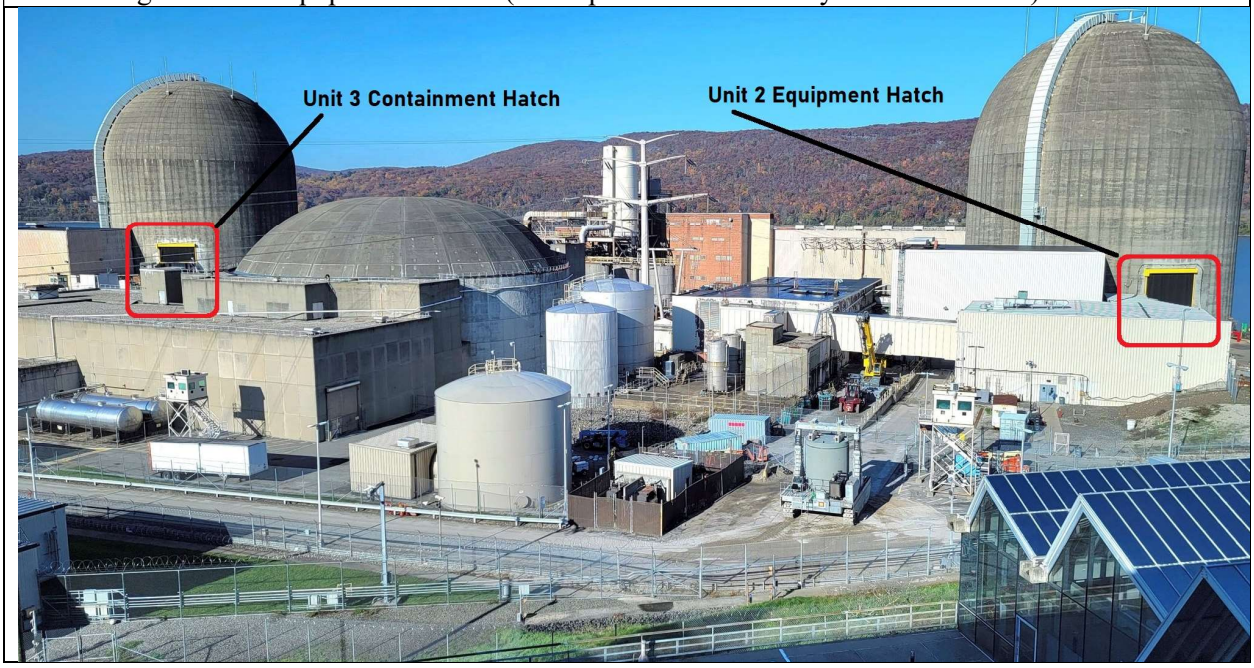
Dave Lochbaum: Summary of November 2022 NRC Violation at Indian Point

On November 17, 2022, the U.S. Nuclear Regulatory Commission (NRC) issued a report on oversight efforts performed by eleven NRC inspectors at Indian Point. The NRC's report included one violation "for failing to develop and implement a radiation protection program to minimize the introduction of residual reactivity into the site."

NRC inspectors reviewed documents in March 2022 for the work performed to enlarge the equipment hatch openings in the reactor containments and install roll-up doors in the openings.



The picture above shows Unit 3 on the left and Unit 2 on the right. Encased within the red rectangles are the original round equipment hatches (lower portions obscured by other structures.)



The picture above shows Unit 3 on the left and Unit 2 on the right. Encased within the red rectangles are the enlarged, rectangular equipment hatches (lower portions obscured by other structures.)

The picture above shows a roll-up door for a nuclear power plant. This is not the exact model used for the Indian Point containment equipment hatches, but it illustrates the concept of multiple horizontal steel slats that can be raised or lowered as a unit.

The documents stated that "no airflow will travel outward of the enlarged equipment hatch area, only inward." The point is to maintain a negative pressure within the containment, even with the roll-up door partially or fully open, so that clean air flows into the containment instead of potentially radioactively contaminated air flowing out.

Negative pressure is maintained using one or more large fans that pull air from within the containment and exhaust it through ducts to the atmosphere. These exhaust pathways are monitored for radioactivity and high levels of radioactivity will trigger closure of dampers to stop the exhaust flow and any release of radioactivity. As the roll-up door opens, the speed of the fan is increased or additional fan(s) started so that the exhaust flow exceeds the inflow through the opened roll-up door such that the pressure within containment is lower than the outside or atmospheric pressure.

The NRC inspectors questioned how the requirement for inward flow was being monitored and controlled. Workers entered the NRC's concern into the corrective action program to resolve it.

In June 2022, NRC inspectors observed removal of the Unit 3 steam domes (i.e., the upper portions of the steam generators) from containment. They noticed strips hanging from the partially raised roll-up door blowing inward and sometimes blowing outward. Workers performing the task were unaware of the requirements for inward airflow and a copy of the procedure imposing the requirements could not be readily located. No cutting or grinding activities that could spawn airborne radioactive particles were in progress and an air sample taken that day did not indicate any releases of radioactivity.

In July 2022, NRC inspectors reviewed steps taken to strengthen controls over the containment roll-up doors which include closing the roll-up door upon indication of outward airflow or significant changes to ventilation systems that could adversely affect inward airflow.

The NRC's inspection report noted a similar problem at another nuclear plant undergoing decommissioning in which hundreds of discrete radioactive particles were found in the site's soil due in part to lack of negative pressure during removal of components through the containment hatches.

The NRC's violation at Indian Point was labeled "Deficient Design Change Implementation and Controls Resulted in Potential of Unfiltered Radioactivity Release to the Environment." Unlike the other site, there was no evidence at Indian Point that radioactivity flowed outward through the containment roll-up doors during the time that controls were inadequate.

Lochbaum's opinion:

The concerns raised by the NRC inspectors in March 2022 should have resulted in corrective actions that prevented the June 2022 event. Procedures were revised after the March 2022 finding, but those procedures proved insufficient to preclude recurrence.

After the June 2022 event, procedures were revised. Because revised procedures after the March 2022 finding did not prevent recurrence, it's unclear how revising procedures after the June 2022 event will be any more successful.

Having reviewed literally thousands of corrective active reports at nuclear plants, my experience is that in cases like this, the corrective actions always including training for workers on the revised procedures. In many cases, the corrective actions also included JITT – Just in Time Training. This training involves pre-job briefings for workers before than open the roll-up door on the administrative controls applied when the door is open and the contingency actions to be taken if problems arise while the door is open.

The best procedure in the world counts for little if workers are not cognizant of its contents. Perhaps the corrective actions taken after the June 2022 event include training, but no evidence in the NRC's inspection report even suggests it.

Additionally, even absent the NRC's finding in March 2022, Holtec had an opportunity to have become aware of this problem and prevented it. As NRC noted, a problem of outflow through the open containment hatch at another site resulted in remediation of contaminated soil. Holtec could have, and should have, learned from this operating experience and taken steps to prevent it from happening at Indian Point instead of waiting to learn from their own mistake.