

Decision Documentation for Reactive Inspection
(Deterministic & Risk Criteria Analyzed)
(MC 0309 Enclosure 1)

PLANT: Indian Point Unit 3	EVENT DATE: 05/09/2015	EVALUATION DATE: 05/15/2015
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Brief Description of the Significant Operational Event or Degraded Condition:

On May 9, 2015, at 5:50 p.m., Indian Point Unit 3 experienced an automatic reactor trip as a result of a failure of the #31 main transformer and subsequent main generator lockout and turbine trip. A Notification of Unusual Event (UE) was declared at 6:01 p.m. for an explosion or fire within the station's Protected Area. The fire was initially extinguished by the station's deluge system. The fire then reignited twice and was extinguished by both the site fire brigade and two offsite fire departments who responded to the event. The UE was exited at 9:03 p.m.

The reactor trip was uncomplicated. All control rods inserted into the reactor core, and all safety systems responded as designed. The NRC Resident Inspectors responded to the site and independently confirmed that the plant was in a stable, safe condition.

Unit 3 is currently in Mode 4, Hot Shutdown, with normal offsite electrical power available and decay heat being removed by the residual heat removal system. Unit 2 continues to operate at 100 percent power.

Water accumulation was noted in the safety-related switchgear room (reports ranged from 1" to 2"). This water is believed to have come from the fire protection deluge system and made its way into the switchgear room through a floor drain.

Resident Inspectors conducted immediate follow-up inspections of the plant and operator response to the event.

Y/N	DETERMINISTIC CRITERIA
N	a. Involved operations that exceeded, or were not included in the design bases of the facility.
	Remarks: None of the operations during the event exceeded or were not included in the design bases of the facility.
N	b. Involved a major deficiency in design, construction, or operations having potential generic safety implications.
	Remarks: No major design, construction, or operation deficiencies having potentially generic implications were identified. Any design deficiencies appear to be related to the unit-specific fire protection and flood protection features.
N	c. Led to a significant loss of integrity of the fuel, primary coolant pressure boundary, or primary containment boundary of a nuclear reactor.
	Remarks: No loss of integrity in the fuel, pressure boundary, or containment occurred.
N	d. Led to the loss of a safety function or multiple failures in systems used to mitigate an actual event.
	Remarks: No loss of safety function or mitigating system failures occurred.
N	e. Involved possible adverse generic implications.
	Remarks: No generic implications were identified as a result of the event.

Y	f. Involved significant unexpected system interactions.
	Remarks: Yes. Fire protection deluge water made its way into the safety-related Unit 3 switchgear room.
N	g. Involved repetitive failures or events involving safety-related equipment or deficiencies in operations.
	Remarks: No repetitive failures involving safety-related equipment or deficiencies in operations were identified. The #31 main transformer is non-safety related.
N	h. Involved questions or concerns pertaining to licensee operational performance.
	Remarks: No. Operators responded to an automatic reactor trip in accordance with procedures. No deficiencies identified thus far with operator performance.

CONDITIONAL RISK ASSESSMENT

RISK ANALYSIS BY:

Wayne Schmidt

DATE: 05/15/2015

Brief Description of the Basis for the Assessment:

Plant Physical Inputs and Observations

Due to the generator trip and high temperature sensed in the switchyard the transformer fire deluge system initiated on the two main transformers, the unit auxiliary transformer and the water curtain protection. These transformers are located in the Transformer Yard, which had a base plant elevation of 18 ft. The transformers have a moat below them, with the maximum capacity of about 80,000 gallons, that would collect transformer oil, fire system deluge water and other firefighting products. Significant flow to the Transformer Yard storm drains would occur once the moat was filled. The deluge control valves for the transformers are located in a deluge valve room in the Switchgear Room. These valves operate when a solenoid valve energizes and ports fire water pressure off the operator. The solenoid valves stay energized after the deluge valve operates and the water flow through the solenoid valves dumps to the floor of the deluge valve room. The deluge valve room floor drain connects to the Switchgear Room floor drains.

The safety-related Switchgear Room, containing the 2A, 3A, 5A, and 6A 480V safety busses, is located in the Control Building at a plant grade of 15 ft adjacent to the Transformer Yard. The function of all the safety related busses could be challenged at a water level of between 4 and 4.5 inches. If this were to occur a station blackout is postulated, plant procedures would direct the use of the Alternate Safe Shutdown path. The Alternate Safe Shutdown path equipment is controlled and powered by MCC 312 and also relies on the Turbine Driven Auxiliary Feedwater pump. The floor drains in the Switchgear Room drain to the Transformer Yard storm drains, which eventually flow to the discharge channel. There is no backflow preventer installed between the Switchgear Room floor drains and the Transformer Yard storm drains. The Emergency Diesel Generator Room is adjacent to the Switchgear Room connected by two doors, with about a 3/8" to 1/2" opening at the bottom sills. The Emergency Diesel Generator Room has a high capacity sump system, because of the need to maintain operability following a service water pipe leak.

During their response, the fire brigade identified water on the floor of the Switchgear Room. The licensee estimates the height to have been 1 -2 inches. The deluge to the transformers and the water curtain were secured in about 26 minutes and the isolated the upstream fire protection valve in about 30 minutes. The standing water in the Switchgear Room drained within about 20 to 30 minutes after the fire water was isolated. Standing water in the Transformer Yard and backflow through the Turbine Building floor drains in the 6.9 KV switchgear area may have taken place.

Assumptions

At the request of the Region the licensee completed an analysis to determine where the water in the Switchgear Room came from. This analysis assumed that the only inflow was from the four deluge solenoid valves at approximately 100 gpm total. They assumed that there was no backflow from the Transformer Yard storm drain system. With this input the licensee estimated that the water level in the Switchgear Room would exceed the estimated 4.5 inch limit in approximately 1 hour and 40 minutes, if the deluge system was not isolated.

Conditional Core Damage Probability Estimate

The estimated conditional core damage probability for an uncomplicated plant transient at IP3 is in the Mid E-7 range. There was no significant equipment out of service at the time of the event.

Internal Flooding of the Switchgear Room is a risk significant issue. Water level above 4 to 4.5 inches has the potential to cause a station blackout and the need to use the Alternate Safe Shutdown to safely shutdown the plant. The probability of the operators failing to safely shutdown the plant using the Alternate Safe Shutdown is estimated by the IP3 External Event SPAR model to be approximately 0.2. This is consistent with the IP3 External Events SDP Notebook. The licensee estimates this failure probability at 0.04.

Assuming the 100 gpm flooding rate, if the deluge system was not isolated or the EDG room doors opened, the switchgear could be challenge in a minimum of 1hr and 40 minutes, which accounts for leakage through the open bottom door sill area on the double doors leading to the EDG room. This does not account for any possible backflow from the Transformer Yard Storm Drain system into the Switchgear Room through the floor drains, which could reduce the time available to take action. If the potential for backflow exists, the point that the Transformer yard drains would be challenged depends on the initial the amount of water in the Transformer Moat and flowrate from the deluge system into the Transformer Moat area.

At this point it is unclear what the specific fire response procedures required relative to deluge valve operation and subsequent isolation. However, the fire brigade in this instance took appropriate action to isolate the deluge system. Other actions that could have been taken were to open the double door between the Switchgear Room and the adjacent Emergency Diesel Generator Room that has drain system capacity that would handle the water flow and prevent exceeding the 4-4.5 inches in the Switchgear Room.

Given the time involved and the ease of the actions, for this 0309 analysis, a human action failure probability of E-4 was assumed.

The CCDP estimate is between 4E-6 (0.04 times 0.0001) to 2E-5 (0.2 time 0.0001), between the No Additional Inspection/SIT overlap and the SIT/AIT overlap regions.

RESPONSE DECISION

USING THE ABOVE INFORMATION AND OTHER KEY ELEMENTS OF CONSIDERATION, AS APPROPRIATE, DOCUMENT THE RESPONSE DECISION TO THE EVENT OR CONDITION, AND THE BASIS FOR THAT DECISION

DECISION AND DETAILS OF THE BASIS FOR THE DECISION:

The staff recommends launching an SIT due to the significant unexpected system interaction experienced between the non-safety-related fire protection deluge system and the safety-related electrical distribution system with the risk being in the range No Additional Inspection/SIT overlap to SIT/AIT overlap. The staff did not initiate an AIT since the scope is limited, the risk ranges from No Additional Inspection/SIT overlap to SIT/AIT overlap, and no special skills are needed from outside the region. Per procedure, the SI Leader will assess the need to upgrade to an AIT once the onsite inspection commences

BRANCH CHIEF REVIEW: A. Burritt /RA/

DATE: 05/18/2015

DIVISION DIRECTOR REVIEW: H. Nieh /RA/

DATE: 05/18/2015

Enclosure 2

Decision Documentation for Reactive Inspection

(Deterministic-only Criteria Analyzed)

PLANT:
Indian Point Unit 3

EVENT DATE:
05/09/2015

EVALUATION DATE:
05/11/2015

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REACTOR SAFETY

Y/N	IIT Deterministic Criteria
N	Led to a Site Area Emergency
	Remarks: No. A Notification of Unusual Event was declared.
N	Exceeded a safety limit of the licensee's technical specifications
	Remarks: No safety limits of the licensee's technical specifications were exceeded.

N	Involved circumstances sufficiently complex, unique, or not well enough understood, or involved safeguards concerns, or involved characteristics the investigation of which would best serve the needs and interests of the Commission
	Remarks: No sufficiently complex, unique, or not well enough understood circumstances, safeguards concerns, or IIT characteristics were involved.
Y/N	SI Deterministic Criteria
N	Significant failure to implement the emergency preparedness program during an actual event, including the failure to classify, notify, or augment onsite personnel
	Remarks: No significant failures of the EP program were identified.
RADIATION SAFETY	
Y/N	IIT Deterministic Criteria
N	Led to a significant radiological release (levels of radiation or concentrations of radioactive material in excess of 10 times any applicable limit in the license or 10 times the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, when averaged over a year) of byproduct, source, or special nuclear material to unrestricted areas
	Remarks: No significant radiological release occurred.
N	Led to a significant occupational exposure or significant exposure to a member of the public. In both cases, "significant" is defined as five times the applicable regulatory limit (except for shallow-dose equivalent to the skin or extremities from discrete radioactive particles)
	Remarks: No significant occupation or public exposure occurred.
N	Involved commercial use of byproduct, source, or special nuclear material and resulted in the potential exposure of a significant number of individuals above occupational or public dose limits
	Remarks: No potential exposure of a significant number of individuals occurred.
N	Involved the deliberate misuse of byproduct, source, or special nuclear material from its intended or authorized use, which resulted in the exposure of a significant number of individuals
	Remarks: No deliberate misuse of licensed material occurred.
N	Involved byproduct, source, or special nuclear material, which may have resulted in a fatality
	Remarks: No byproduct, source, or special nuclear material use may have resulted in a fatality.
N	Involved circumstances sufficiently complex, unique, or not well enough understood, or involved safeguards concerns, or involved characteristics the investigation of which would best serve the needs and interests of the Commission
	Remarks: No sufficiently complex, unique, or not well enough understood circumstances, safeguards concerns, or IIT characteristics were involved.

Y/N	AIT Deterministic Criteria
N	<p>Led to a radiological release of byproduct, source, or special nuclear material to unrestricted areas that resulted in occupational exposure or exposure to a member of the public in excess of the applicable regulatory limit (except for shallow-dose equivalent to the skin or extremities from discrete radioactive particles)</p> <p>Remarks: No radiological release occurred.</p>
N	<p>Involved the deliberate misuse of byproduct, source, or special nuclear material from its intended or authorized use and had the potential to cause an exposure of greater than 5 rem to an individual or 500 mrem to an embryo or fetus</p> <p>Remarks: No deliberate misuse of byproduct, source, or special nuclear material was involved.</p>
N	<p>Involved the failure of radioactive material packaging that resulted in external radiation levels exceeding 10 rads/hr or contamination of the packaging exceeding 1000 times the applicable limits specified in 10 CFR 71.87</p> <p>Remarks: No radioactive packaging was involved.</p>
Y/N	SI Deterministic Criteria
N	<p>May have led to an exposure in excess of the applicable regulatory limits, other than via the radiological release of byproduct, source, or special nuclear material to the unrestricted area; specifically</p> <ul style="list-style-type: none"> •occupational exposure in excess of the regulatory limits in 10 CFR 20.1201 •exposure to an embryo/fetus in excess of the regulatory limits in 10 CFR 20.1208 •exposure to a member of the public in excess of the regulatory limits in 10 CFR 20.1301 <p>Remarks: No. The event would not have led to an exposure in excess of the applicable regulatory limits</p>
N	<p>May have led to an unplanned occupational exposure in excess of 40 percent of the applicable regulatory limit (excluding shallow-dose equivalent to the skin or extremities from discrete radioactive particles)</p> <p>Remarks: No. The event would not have led to an unplanned occupational exposure.</p>
N	<p>Led to unplanned changes in restricted area dose rates in excess of 20 rem per hour in an area where personnel were present or which is accessible to personnel</p> <p>Remarks: No. The event did not lead to unplanned changes in restricted area dose rates.</p>
N	<p>Led to an uncontrolled, unplanned, or abnormal release of radioactive material to the unrestricted area</p> <ul style="list-style-type: none"> •for which the extent of the offsite contamination is unknown; or, •that may have resulted in a dose to a member of the public from loss of radioactive material control in excess of 25 mrem (10 CFR 20.1301(e)); or, •that may have resulted in an exposure to a member of the public from effluents in excess of the ALARA guidelines contained in Appendix I to 10 CFR Part 50 <p>Remarks: No. The event did not lead to an uncontrolled, unplanned, or abnormal release of radioactive material to the unrestricted area.</p>
N	<p>Led to a large (typically greater than 100,000 gallons), unplanned release of radioactive liquid inside the restricted area that has the potential for ground-water, or offsite, contamination</p> <p>Remarks: No. The event did not lead to an unplanned release of radioactive liquid.</p>

N	Involved the failure of radioactive material packaging that resulted in external radiation levels exceeding 5 times the accessible area dose rate limits specified in 10 CFR Part 71, or 50 times the contamination limits specified in 49 CFR Part 173
	Remarks: No radioactive packaging was involved.
N	Involved an emergency or non-emergency event or situation, related to the health and safety of the public or on-site personnel or protection of the environment, for which a 10 CFR 50.72 report has been submitted that is expected to cause significant, heightened public or government concern
	Remarks: No. Although the event has and is expected to continue to cause significant, heightened public or government concern, the external interest is associated with the non-nuclear safety issue of transformer oil leakage.
SAFEGUARDS/SECURITY	
Y/N	IIT Deterministic Criteria
N	Involved circumstances sufficiently complex, unique, or not well enough understood, or involved safeguards concerns, or involved characteristics the investigation of which would best serve the needs and interests of the Commission
	Remarks: No sufficiently complex, unique, or not well enough understood circumstances, safeguards concerns, or IIT characteristics were involved.
N	Failure of licensee safety-related equipment or adverse impact on licensee operations as a result of a safeguards initiated event (e.g., tampering).
	Remarks: No safeguards initiated events occurred.
N	Actual intrusion into the protected area.
	Remarks: No intrusion into the protected area occurred.
Y/N	AIT Deterministic Criteria
N	Involved a significant infraction or repeated instances of safeguards infractions that demonstrate the ineffectiveness of facility security provisions
	Remarks: No safeguards infractions were involved.
N	Involved repeated instances of inadequate nuclear material control and accounting provisions to protect against theft or diversions of nuclear material
	Remarks: No inadequate nuclear material control and accounting provisions were involved.
N	Confirmed tampering event involving safety-related or security-related equipment
	Remarks: No tampering events were confirmed.
N	Substantial failure in the licensee's intrusion detection or package/personnel search procedures which results in a significant vulnerability or compromise of plant safety or security
	Remarks: No substantial failure in the licensee's intrusion detection or package/personnel search procedures occurred.

Y/N	SI Deterministic Criteria
N	Involved inadequate nuclear material control and accounting provisions to protect against theft or diversion, as evidenced by inability to locate an item containing special nuclear material (such as an irradiated rod, rod piece, pellet, or instrument)
	Remarks: No inadequate nuclear material control and accounting provisions were involved.
N	Involved a significant safeguards infraction that demonstrates the ineffectiveness of facility security provisions
	Remarks: No safeguards infractions were involved.
N	Confirmation of lost or stolen weapon
	Remarks: No weapons were lost or stolen.
N	Unauthorized, actual non-accidental discharge of a weapon within the protected area
	Remarks: No weapons were discharged.
N	Substantial failure of the intrusion detection system (not weather related)
	Remarks: No substantial failure of IDS occurred.
N	Failure to the licensee's package/personnel search procedures which results in contraband or an unauthorized individual being introduced into the protected area
	Remarks: No contraband or unauthorized individuals were introduced to the protected area.
RESPONSE DECISION	
USING THE ABOVE INFORMATION AND OTHER KEY ELEMENTS OF CONSIDERATION AS APPROPRIATE, DOCUMENT THE RESPONSE DECISION TO THE EVENT OR CONDITION, AND THE BASIS FOR THAT DECISION	
DECISION AND DETAILS OF THE BASIS FOR THE DECISION: See Enclosure 1 also for basis of decision. No Enclosure 2 deterministic criteria were met.	
BRANCH CHIEF REVIEW: A. Burritt /RA/	
DATE: 05/18/2015	
DIVISION DIRECTOR REVIEW: H. Nieh /RA/	
DATE: 05/18/2015	