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Fred Dacimo
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December 08, 2004

Re: Indian Point Units No. 2 and 3
Docket Nos. 50-247 and 50-286
NL-04-151

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Reply to RAI Regarding Bulletin 2003-01, "Potential Impact of Debris Blockage On Emergency Sump Recirculation At Pressurized Water Reactors" (TAC Nos. M9582 and M9583)

References:

1. NRC letter dated September 30, 2004, "Request for Additional Information regarding Bulletin 2003-01, "Potential Impact of Debris Blockage On Emergency Sump Recirculation At Pressurized Water Reactors" (TAC Nos. M9582 and M9583)

2. ENO letter to NRC (NL-03-128), "60 Day Response to NRC Bulletin 2003-01 Regarding Potential Impact of Debris Blockage of Emergency Sumps," dated August 7, 2003.

Dear Sir;

This letter provides ENO Nuclear Operations, Inc. (ENO) response, Attachment 1, to the NRC request for additional information (Reference 1) regarding the ENO letter addressing Bulletin 2003-01 for Indian Point 2 (IP2) and Indian Point 3 (IP3), respectively (Reference 2).

Commitments made by the licensee are listed in Attachment 2 to this letter. If you have any questions or require additional information, please contact Mr. Patric W. Conroy, Licensing Manager at 914-734-6668.

Sincerely,

Fred R. Dacimo
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cc: next page

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ATTACHMENT 1 TO NL-04-151

Reply to RAI Regarding Bulletin 2003-01,
"Potential Impact of Debris Blockage On Emergency Sump Recirculation
At Pressurized Water Reactors" (TAC Nos. M9582 and M9583)

ENO NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNITS 2 AND 3
DOCKETS 50-247 AND 50-286

NRC RAI Question #1

In item 1 of Attachment 1 of its August 7 response, ENO stated a lesson plan was being prepared that would present the mechanisms and potential consequences of sump clogging and that the initial training cycles would be completed by January 2004. However, the NRC staff finds that the response does not completely discuss the operator training to be implemented.

Provide a detailed discussion of the new training the operators now receive, including the indications of sump clogging for which the operators are instructed to monitor. The NRC staff notes that on page 1 of Attachment 1 of the Bulletin response, ENO stated that operators are trained to look for erratic flow as a symptom of sump clogging. However, it did not state that operators take advantage of other indications, such as pump amperage fluctuations or cavitation noises, that are likely to be available. Therefore, discuss all of the indications that operators are trained to monitor as being symptomatic of sump clogging.

Response to NRC Question #1

Training was presented to the licensed operators at Indian Point to specifically address sump blockage concerns identified in NRC Bulletin 2003-01, including a review of the EOP network to be used for an event of this type. This training focused on symptoms and indications of sump or recirculation flow path blockage, including erratic flow, cavitation noises and/or abnormal vibration. Indian Point Lesson Plans EOP034E1 (IP 2) and LRQ-EOP-07 (IP 3), document the training presented. Additionally, EOP training is provided to the Indian Point operators as part of the two-year training plan. Engineering analysis described in response to RAI #2 indicates planned work to identify additional operator guidance. Additional training for plant modifications and/or procedure changes associated with sump blockage will be evaluated and conducted as needed.

Indian Point EOP ES-1.3, "Transfer to Cold Leg Recirculation", contains guidance to use the internal recirculation pumps to establish sump recirculation flow, either through the normal flow path or as a suction source for the high head Safety Injection (SI) Pumps. If adequate core cooling is not established or is lost, external recirculation using the RHR pumps is directed. Indian Point 2 and 3 each provide two internal recirculation pumps in a dedicated sump and external pumps (the RHR pumps) supplied from a separate sump. Operator guidance for the loss of the SI recirculation function (both internal and external) is contained in ECA-1.1, "Loss of Emergency Coolant Recirculation"; loss of sump recirculation due to sump blockage is a potential entry into this procedure.

During a sump or suction flow path blockage condition, the RHR pumps would exhibit cavitation noises and/or abnormal vibration which might be heard by the operators Control Room flow indicators will be the primary method of detecting problems with recirculation that may be indicative of sump blockage since post-accident conditions may limit access. Ammeters for the recirculation pumps and RHR pumps are not provided. The location of the recirculation pumps within containment eliminates the use of audible cavitation indications.

Currently, Indian Point EOP ES-1.3, "Transfer to Cold Leg Recirculation", and EOP ECA-1.1, "Loss of Emergency Coolant Recirculation", would be used in response to a sump blockage condition. EOP ES-1.3 directs the operators to implement EOP ECA-1.1 at any time

recirculation flow from containment to the RCS cannot be established or maintained. Loss of recirculation capability due to sump blockage would require entry into EOP ECA-1.1. EOP ES-1.3 directs the operators to monitor recirculation sump level, and transition to EOP ECA-1.1 if sump level has not reached the value necessary to support recirculation pump operation. Sump level below this value, with RWST level at or below the switchover setpoint, may indicate a pipe rupture outside of containment or blockage of the flowpath to the sump. EOP ES-1.3 also directs the operators to monitor recirculation flow once recirculation has been established. Low or erratic recirculation flow may indicate recirculation pump or RHR pump distress, a potential result of loss of required NPSH due to sump blockage.

Additionally, EOP ES-1.3 (both units) directs the operators to check SI pump suction pressure during high head recirculation. Low suction pressure may indicate degraded recirculation pump or RHR pump performance, a potential result of loss of required NPSH due to sump blockage.

NRC RAI Question #2

In item 2 of Attachment 1, ENO stated that it intended to participate in an Owners Group program that was being developed to assess potential changes to the generic [Westinghouse] Emergency Response Guidelines and that this information would be subsequently used to identify potential plant-specific changes to the Emergency Operating Procedures (EOPs) for IP2 and IP3. The NRC staff notes that the Westinghouse Owners Group (WOG) has developed operational guidance in response to Bulletin 2003-01 for Westinghouse and Combustion Engineering pressurized-water reactors.

a. Provide a discussion of ENO's plans to consider implementing this new WOG guidance. Include a discussion of the WOG-recommended compensatory measures that have been or will be implemented at IP2 and 3 and the evaluations or analyses performed to determine which of the WOG recommended changes are acceptable at these facilities.

b. Provide the technical justification for those WOG recommended compensatory measures not being implemented.

c. Include a detailed discussion of the procedures being modified, the operator training being implemented, and the schedule for implementing these compensatory measures.

Response to NRC Question #2

The Westinghouse Owners Group (WOG) evaluated potential changes to the Westinghouse Emergency Response Guidelines as recommended by NRC Bulletin 2003-01 and the impact of these changes on the Technical Specifications, licensing and design basis, and operational issues associated with the proposed changes. In support of this evaluation, an Engineering Evaluation and Analysis Report (WCAP-16204, Rev. 1) was developed to document the assessment of potential guideline changes designated as Candidate Operator Actions (COAs). The COAs were selected from the actions outlined in NRC Bulletin 2003-01, with operations input from the WOG Procedures Working Group. In parallel with development of the COAs, the ERG Maintenance Core Group and Westinghouse personnel developed guideline SBCRG, "Sump Blockage Control Room Guideline", to provide interim compensatory guidance for

responding to sump blockage during the recirculation-mode operation of the ECCS and/or containment spray system. Implementation of the SBCRG is addressed by WCAP-16204.

WCAP-16204 includes evaluations of seventeen COAs. Six of these seventeen COAs are specifically associated with the Combustion Engineering (CE) plant design, or the ice condenser containment design, and are not applicable to Indian Point. The "not applicable" COAs are A1a-CE, A1a-Ice, A3-CE, A8-CE, A9-CE and A11. This section identifies which of the remaining eleven applicable COAs are selected for implementation at Indian Point, including a basis, method and schedule for implementation. For those COAs not selected for implementation at Indian Point, this section provides a basis for not implementing. Any differences in design between IP 2 and IP 3 that affect COA implementation are also identified. Plant-specific design information in this evaluation is based on power uprate (SPU) conditions for both Units (IP2 implemented during SPU in 2R16 and IP3 is anticipated in March 2005).

WCAP-16204 Candidate Operator Actions Selected for Implementation

A1a-W Candidate Operator Action 1A – Westinghouse Plants Operator Action to Secure One Spray Pump

This COA addresses the NRC Bulletin 2003-01 Interim Compensatory Measure "procedural modifications, if appropriate, that would delay switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary ..."

In WCAP-16204, the action to secure one containment spray pump prior to initiating containment sump recirculation was evaluated for Westinghouse-designed plants. This action is intended to:

- Reduce the flow rate to the sump when containment recirculation begins,
- Reduce the pressure differential across the emergency sump screen if there is a build up of debris, and
- Provide a modest time delay to the start of containment recirculation during a small break loss of coolant accident (SBLOCA).

The WCAP-16204 evaluation of this action resulted in the following recommendation: "In general, implementation of this step is recommended for plants with containment fan coolers capable of removing significant heat loads."

The Containment Spray system and the Containment Fan Cooler Units (FCU) serve as independent sources of containment heat removal to assure that post-accident containment temperature and pressure do not exceed their design basis values. A combination of three (of five) FCUs operating with one (of two) containment spray train is capable of maintaining post-accident containment temperature and pressure below their design basis values, assuming a worst-case single active failure.

At IP 2, one train of containment spray provides sufficient iodine removal capability to ensure post-accident fission product leakage will not exceed the applicable dose limits (based on NUREG-1465 source term modeling). Spray is assumed to remove inorganic iodine for a specified period following the accident (3.5 hours); therefore spray flow may be terminated after this period, when containment pressure is reduced and stabilized. EOP E-1, "Loss of Reactor or Secondary Coolant", provides direction to stop both containment spray pumps if containment

pressure has been reduced below the spray signal reset pressure and containment area radiation is normal. If containment area radiation is not normal, containment spray is maintained in service as necessary to assure iodine removal. Currently, no procedural guidance exists to stop one of two operating containment spray pumps earlier in the LOCA recovery.

At IP 3, any of the combinations of containment spray pumps and FCUs required for containment heat removal will provide sufficient iodine trapping capability to ensure post-accident fission product leakage will not exceed the applicable dose limits (based on TID-14844 release fractions). Therefore, if all five FCUs are running, the spray pumps are not required for containment iodine removal. EOP E-1, "Loss of Reactor or Secondary Coolant", provides direction to stop both containment spray pumps if containment pressure has been reduced below the spray signal reset pressure or all FCUs are running. An amendment for alternate source term, currently scheduled for March 2005, will revise the IP3 design to be consistent with IP2 assuming a 4 hour spray period. Currently, no procedural guidance exists to stop one of two operating containment spray pumps earlier in the LOCA recovery.

IP2 and 3, EOP ES-1.3, "Transfer to Cold Leg Recirculation", provides direction to stop one containment spray pump (if both are running) early in the recirculation alignment sequence to reduce RWST outflow and reduce emergency diesel generator loading. One containment spray pump remains running until the RWST is essentially empty. Note that in the Indian Point design, the containment spray pumps are not aligned to the containment sump. Containment spray during the recirculation phase, if necessary, is provided by the recirculation pumps. The benefit realized by stopping one spray pump before recirculation switchover is therefore only to delay the time to recirculation switchover by reducing RWST outflow. This benefit is applicable only to smaller LOCAs; for large LOCAs, stopping one spray pump will have an insignificant effect on the time to recirculation switchover. Indian Point will perform an evaluation of actions to stop one of two operating containment spray pumps early in the LOCA recovery (in EOP E-1), with containment pressure above the spray signal reset pressure and decreasing. This evaluation will consider the complete interruption of spray flow due to a failure of the active spray pump, with subsequent operator action to restart a spray pump. Generic analyses detailed in WCAP-16204 determined that, if a spray pump is restarted within 10 minutes after failure of the running pump, containment pressure and temperature will remain below assumed limits for the reference plant. The Indian Point evaluation will determine if the WCAP-16204 analysis is bounding with regard to containment pressure and temperature values in the plant-specific analysis of record, and will determine if plant-specific dose analysis assumptions can be satisfied with a temporary interruption of spray flow. Although the iodine removal mechanisms currently differ between the units (IP 2 requires spray operation for iodine removal whereas IP 3 also credits charcoal in the fan coolers for iodine removal), the IP 3 evaluation will be performed assuming the alternate source term amendment is approved and the FCU charcoal is no longer in the licensing basis for iodine removal. This evaluation is currently scheduled for March 25, 2005.

If the evaluation demonstrates that a temporary interruption of spray flow is acceptable, EOP E-1 (both units) will be revised to include an action to stop a containment spray pump, if both are running and an adequate number of fan coolers are operating (based on containment pressure value and trend). This action will be consistent with the example provided in ERG Maintenance Item DW-03-018, with plant-specific modifications as necessary to ensure dose analysis assumptions are met. Procedural revisions will be made about 8 weeks after the engineering analysis and training will be initiated during the following training cycle. Simulator validation and

operator training will be conducted prior to implementation of any resulting EOP changes per procedure.

A3-W Candidate Operator Action 3 – Westinghouse Plants
Terminate One Train of Safety Injection After Recirculation Alignment

This COA addresses the NRC Bulletin 2003-01 Interim Compensatory Measure "to terminate one train of safety injection after recirculation alignment."

In WCAP-16204, the action to terminate one train of safety injection (SI) following containment sump recirculation alignment, assuming two trains of SI are in operation and are running normally, was evaluated to determine the advantages and disadvantages of stopping/throttling all but one SI train after initiation of recirculation. The ERG LOCA strategy to ensure sufficient RCS inventory and maintain core heat removal was maintained.

The WCAP-16204 evaluation of this action resulted in the following recommendation: "Each plant must consider the advantages and disadvantages as they apply to their plant specific design and incorporate interim compensatory measures that are risk beneficial with respect to containment sump blockage."

Per the single active failure analysis at Indian Point, one (of two) recirculation pump, or one (of two RHR pump, and two (of three) SI pumps are required during the recirculation phase of safety injection operation.

The current direction in EOP ES-1.3, "Transfer to Cold Leg Recirculation", to establish SI recirculation by starting only one recirculation pump and verify a minimum acceptable flow rate to ensure adequate core cooling and, if required, recirculation spray, does address this COA. However, later in the procedure, a second recirculation pump is started to establish additional heat removal capability (redundant cooling path) if adequate power is available, even if the running recirculation pump is providing adequate recirculation flow. This action increases flow through the recirculation sump, potentially entraining additional debris on the sump screens, and is not consistent with the intent of this COA.

In order to address the issue of flow through the recirculation sump with the potential for additional debris entrainment on the sump screens, Indian Point EOP ES-1.3 (both Units) will be revised, pending engineering evaluation, to include additional guidance regarding starting or stopping the second recirculation pump. This guidance will consider the need to supplement recirculation flow, to maintain adequate core cooling and recirculation spray if necessary. An engineering evaluation to consider the above is scheduled for April 28, 2005. Necessary procedure revisions will be made in about 8 weeks after the engineering evaluation and training will be initiated in the next practicable training cycle. Simulator validation and operator training will be conducted prior to implementation of any resulting EOP changes per procedure.

A5 Candidate Operator Action 5
Refill of Refueling Water Storage Tank

This COA addresses the NRC Bulletin 2003-01 Interim Compensatory Measure "Ensure that alternative water sources are available to refill the refueling water storage tank (RWST) or otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere."

In WCAP-16204, the action to preemptively prepare to refill the RWST or lineup an alternate makeup source bypassing the RWST, in anticipation of possible sump blockage following the initiation of recirculation was evaluated. This action is intended to provide an additional source of makeup water to the RCS and containment in the event recirculation capability is unavailable.

The WCAP-16204 evaluation of this action resulted in the following recommendation: "Implementation of ERG changes to initiate early action to line up to refill the RWST or bypass it to support using an alternate makeup source, if needed, are generally recommended. Actual refill is not generally recommended until after switchover has occurred."

At Indian Point, after SI switchover to recirculation is complete, one containment spray pump remains running until the RWST is essentially empty. At IP3, a charging pump may also remain running and aligned to the RWST until this point. Once the last remaining pump taking suction from the RWST is stopped and isolated from the tank, no additional water can be transferred into the RCS or containment from the RWST.

Indian Point EOP ECA-1.1, "Loss of Emergency Coolant Recirculation", provides guidance to refill the RWST from the primary water system after switchover to sump recirculation, if a loss of recirculation capability occurs. The Indian Point design does not provide for cross-connecting the IP RWSTs, and does not provide other major RWST refill sources.

In order to provide additional assurance that a supply of borated water will be available in the event recirculation capability is unavailable due to sump blockage, both Units will include actions to establish makeup to the RWST in EOP ES-1.3, "Transfer to Cold Leg Recirculation", after the last pump taking suction from the RWST is stopped and isolated from the tank. Note that injection of this additional water into the RCS or containment will not be directed unless sump recirculation capability is lost. Actions to provide additional makeup flow to the RCS from a borated water source, after loss of recirculation capability due to sump blockage, will be included in the new Indian Point procedure for response to sump blockage. Development of this procedure is included in COA A9-W, "Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation". This procedure will be revised in about 8 weeks after the results of COA A9-W identify a strategy for use of the water and training will be initiated in the next practicable training cycle. Simulator validation and operator training will be conducted prior to implementation of any resulting EOP changes per procedure.

A8-W Candidate Operator Action 8 – Westinghouse Plants
Provide Guidance on Symptoms and Identification of Containment Sump Blockage

This COA addresses the NRC Bulletin 2003-01 Interim Compensatory Measure "operator training on indications of and responses to sump clogging."

In WCAP-16204, available instrumentation to identify symptoms of containment sump blockage or degraded ECCS pump performance was evaluated for Westinghouse-designed plants. Use of this instrumentation is intended to enable operators to identify sump blockage, then perform mitigative actions in response to the condition.

The WCAP-16204 evaluation of this action resulted in the following recommendation: "In general the proposed change is advantageous to all/most plants; however each plant must consider the advantages and disadvantages as they apply to their plant specific design and incorporate this action if it is determined to be risk beneficial with respect to containment sump blockage."

Indian Point EOP ES-1.3, "Transfer to Cold Leg Recirculation", and EOP ECA-1.1, "Loss of Emergency Coolant Recirculation", would be used in response to a sump blockage condition. EOP ES-1.3 directs the operators to implement EOP ECA-1.1 at any time recirculation flow from containment to the RCS cannot be established or maintained. Loss of recirculation capability due to sump blockage would require entry into EOP ECA-1.1. EOP ES-1.3 directs the operators to monitor recirculation sump level, and transition to EOP ECA-1.1 if sump level has not reached the value necessary to support recirculation pump operation. Sump level below this value, with RWST level at or below the switchover setpoint, may indicate a pipe rupture outside of containment or blockage of the flowpath to the sump. EOP ES-1.3 also directs the operators to monitor recirculation flow once recirculation has been established. Low or erratic recirculation flow may indicate recirculation pump or RHR pump distress, a potential result of loss of required NPSH due to sump blockage.

Additionally, EOP ES-1.3 (both units) directs the operators to check SI pump suction pressure during high head recirculation. Low suction pressure may indicate degraded recirculation pump or RHR pump performance, a potential result of loss of required NPSH due to sump blockage.

Training was presented to the licensed operators at Indian Point specifically to address sump blockage concerns identified in NRC Bulletin 2003-01 as discussed in response to RAI #1. To support implementation of a revised procedure for response to sump blockage (per COA A9-W), steps directing the operator to monitor for indications of sump blockage will be added to Indian Point EOP ES-1.3, "Transfer to Cold Leg Recirculation", and EOP ECA-1.1, "Loss of Emergency Coolant Recirculation" (both IPs). These steps will be based on the example provided in ERG Maintenance Item DW-03-018. The plant-specific indications discussed above will be determined following an evaluation of the instrumentation available at Indian Point. The available instrumentation will be assessed for adequacy in diagnosing sump blockage using, in part, guidance provided by the SBCRG Background Information. This assessment will determine the optimal indications to use for identifying a sump blockage condition, to minimize the potential for misdiagnosis by providing clear definitive setpoint/trending parameters. This evaluation will be complete April 28, 2005. Necessary procedure revisions will be made in about 8 weeks after the engineering evaluation and training will be initiated in the next practicable training cycle. Simulator validation and operator training will be conducted prior to implementation of any resulting EOP changes per procedure.

A9-W Candidate Operator Action 9 – Westinghouse Plants
Develop Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation

This COA addresses the NRC Bulletin 2003-01 Interim Compensatory Measure "operator training on indication of and responses to sump clogging."

In WCAP-16204, the feasibility and appropriateness of actions related to responses to sump clogging, loss of suction and cavitation were evaluated. These actions are intended to mitigate the sump blockage condition and provide recovery actions in the form of a generic guideline.

The WCAP-16204 evaluation of these actions resulted in the following recommendation: "In general, the following contingency actions in response to sump blockage were determined to be advantageous:

a. Stop Pumps Experiencing Loss of Suction to Prevent Permanent Pump Damage
b. Reduce Recirculation Flow to the Minimum Required to Support Design basis or Critical Safety Functions
c. Verify Containment Cooling Fan Unit Operation to Minimize Cooling Demand for Containment Spray Flow
d. Establish Alternate Water Sources to Inject Into the Reactor Core and Spray Into the Containment
e. Optimize Use of Available Sources of Flow for Injection Into the Reactor Core and Spray Into the Containment
f. Cool-down and Depressurize the RCS Using the Secondary System to Reduce Required Injection Flow to the RCS and Allow Placing the RHR System in Service"

These contingency actions have been included in the generic guideline SBCRG, "Sump Blockage Control Room Guideline".

Currently, EOP ES-1.3, "Transfer to Cold Leg Recirculation", and EOP ECA-1.1, "Loss of Emergency Coolant Recirculation", would be used in response to a sump blockage condition. EOP ES-1.3 directs the operators to implement EOP ECA-1.1 at any time recirculation flow to the RCS cannot be established or maintained. Loss of recirculation capability due to sump blockage would require entry into EOP ECA-1.1 (additional EOP ECA-1.1 entry conditions are discussed in the response to A8-W). EOP ECA-1.1 provides guidance to continue attempts to restore recirculation capability, delay RWST depletion by adding makeup and reducing outflow, maintain adequate core cooling, depressurize the RCS to minimize break flow and inject the SI accumulators, and add makeup to the RCS from an alternate source. The Indian Point operators receive training on these EOPs as part of their two year training plan.

In order to enhance recovery from a sump blockage event, plant-specific guidance for response to containment sump blockage will be developed, based on the generic guideline SBCRG, "Sump Blockage Control Room Guideline". This will be a plant-specific equivalent (both Units) of the guidance provided in the SBCRG. In order to develop this guidance, engineering evaluations are required to establish the effects of adding additional inventory to the RCS/Containment and any limitations on this action. This evaluation of plant specific guidance is scheduled for April 28, 2005. Necessary procedure revisions will be made in about 8 weeks after the engineering evaluation and training will be initiated in the next practicable training cycle. Note that licensees have the latitude to implement the SBCRG guidance as a stand-alone procedure separate from their EOPs, or as part of their current EOP network. Indian Point will

assess each option to provide optimal plant-specific guidance for sump blockage recovery. Simulator validation and operator training will be conducted prior to implementation of any new sump blockage guidance per procedure.

WCAP-16204 Candidate Operator Actions Not Selected for Implementation

A1b Candidate Operator Action 1B
Operator Action to Secure Both Spray Pumps

The WCAP-16204 evaluation of this action resulted in the following recommendation: "Implementation of this step requires effective CFCs and minimal or no requirement for iodine or pH control with spray. Implementation of this step is only recommended for plants with containment fan coolers that can remove 100% of the decay heat load when spray is stopped and spray is not required for iodine removal or pH control."

At Indian Point, the Containment Spray system and the FCUs serve as independent sources of containment heat removal. Either five (of five) containment cooling fans or two (of two) containment spray trains is capable of maintaining post-accident containment temperature and pressure below their design basis values. Design containment heat removal is also provided by a combination of three containment cooling fans operating with one containment spray train, assuming a worst-case single active failure.

At Indian Point IP 2, one train of containment spray provides sufficient iodine removal capability to ensure post-accident fission product leakage will not exceed the applicable dose limits (based on NUREG-1465 source term modeling). Spray is assumed to remove inorganic iodine for a specified period following the accident; therefore spray flow may be terminated after this period, when containment pressure is reduced and stabilized. EOP E-1, "Loss of Reactor or Secondary Coolant", provides direction to stop both containment spray pumps if containment pressure has been reduced below the spray signal reset pressure and containment area radiation is normal. If containment area radiation is not normal, containment spray is maintained in service as necessary to assure iodine removal.

At Indian Point IP 3, the spray requirements and procedural guidance will be the same as for IP2 following approval of the alternate source term amendment anticipated about March 2005. Additionally, one containment spray pump remains operating throughout the switchover to recirculation until the RWST is essentially empty. This assures that containment sump pH will be maintained within the design range for continued iodine removal and retention effectiveness.

The actions described above address reducing RWST inventory depletion when containment depressurization by spray is no longer required, based on specific criteria for containment pressure and iodine removal. Therefore, Indian Point has already implemented direction that satisfies this COA to the extent permissible by the current analysis of record. No further actions associated with this COA will be implemented at Indian Point.

A2 Candidate Operator Action 2
Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation

The WCAP-16204 evaluation of this action resulted in the following recommendation: "As general guidance, implementation of this operator action is recommended only for plants that

have margin in their containment sump NPSH calculation, have the ability to secure one injection train, have the ability to secure one or both spray pumps, and can refill the RWST."

At Indian Point, the Technical Specification minimum RWST volume accounts for sump inventory for recirculation pump NPSH, time for completing the switchover to recirculation, spray inventory for containment pressure relief and sump pH control, water that is physically unavailable from the bottom of the tank, and instrument inaccuracies. A small additional margin is provided in this minimum volume; however the additional NPSH provided by this margin may be needed to overcome the head loss effects of accumulated sump screen debris.

Additionally, COA A4, "Early Termination of One LPSI/RHR Pump Prior to Recirculation Alignment", and COA A10, "Early Termination of One Train of HPSI/ High-Head Injection Prior to Recirculation Alignment (RAS)", will not be implemented at Indian Point for reasons discussed in their associated sections of this response.

For the above reasons, this COA will not be implemented at Indian Point.

A4 Candidate Operator Action 4
Early Termination of One LPSI/RHR Pump Prior to Recirculation Alignment

The WCAP-16204 evaluation of this action resulted in the following recommendation: "Preliminary indications show that stopping one LPSI pump before recirculation may result in core damage and therefore is not risk beneficial."

This evaluation was performed for the Combustion Engineering (CE) designed plants only. Results of the LOCA cases analyzed in Appendix B of WCAP-16204 show that stopping one low-head pump before recirculation may result in core damage.

At Indian Point, one (of two) RHR pump is required to operate during the injection phase and one (of two) RHR pump or one (of two) recirculation pump during the recirculation phases of safety injection. For pump protection, IP3 requires two RHR pumps for recirculation spray. Two RHR pumps are provided to account for an active component failure. The RHR pumps may be manually stopped per Indian Point EOP E-1, "Loss of Reactor or Secondary Coolant", or ES-1.2, "Post LOCA Cooldown and Depressurization", if RCS pressure is greater than the RHR pump shutoff pressure, to prevent damage to the pumps. The RHR pumps will be restarted if RCS pressure subsequently decreases below the RHR pump shutoff pressure.

Therefore, an RHR pump may be manually stopped prior to recirculation alignment only under conditions in which low pressure injection flow or recirculation spray is not required. No further actions associated with this COA will be implemented at Indian Point.

A6 Candidate Operator Action 6
Inject More Than One RWST Volume From a Refilled RWST or by Bypassing the RWST

The WCAP-16204 evaluation of this action resulted in the following recommendation: "This action would only be taken after aligning for recirculation and a subsequent loss of recirculation capability due to sump blockage. This is clearly a beyond design bases situation."

The transfer of greater than one RWST volume to containment is beyond Indian Point design bases assumptions, and may exceed the containment flooding limit with the potential for submergence of equipment and instrumentation inside containment that may be required for the recovery. Indian Point EOP ECA-1.1, "Loss of Emergency Coolant Recirculation", provides guidance for establishing makeup to the RCS from an alternate source (via VCT blended makeup and charging) and allows for injection of additional water from the RWST (refilled from the primary water system). EOP ECA-1.1 is only used following a loss of recirculation capability; a beyond design basis event. Note that the Indian Point design does not provide for cross-connecting the RWSTs.

Actions to provide additional makeup flow to the RCS from a borated water source, after loss of recirculation capability due to sump blockage, will be included in the new Indian Point procedure for response to containment sump blockage, pending engineering analysis. Development of this procedure is covered by COA A9-W, "Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation". No further actions associated with COA A6 will be implemented at Indian Point.

A7 Candidate Operator Action 7
Provide More Aggressive Cooldown and Depressurization Following A Small Break LOCA

The WCAP-16204 evaluation of this action resulted in the following recommendation: "It is recommended that the EPG terminology and usage of 'controlled cooldown' and 'rapid cooldown' be clarified and EPG changes incorporated."

This evaluation was performed for the Combustion Engineering (CE) designed plants only. The Westinghouse Emergency Response Guidelines (ERGs) already address maximizing the cooldown rate up to the Technical Specification limit.

The Indian Point EOPs are based on the ERGs. Indian Point EOP ES-1.2 provides guidance to cooldown and depressurize the RCS to reduce break flow, thereby reducing the injection flow necessary to maintain RCS subcooling and inventory. These actions delay depletion of the RWST. The RCS cooldown rate specified in EOP ES-1.2 is consistent with the Indian Point Technical Specification limit. Therefore, Indian Point has already implemented direction that satisfies this COA based on plant-specific requirements. No further actions associated with this COA will be implemented at Indian Point.

A10 Candidate Operator Action 10
Early Termination of One Train of HPSI/High-Head Injection Prior to Recirculation Alignment (RAS)

The WCAP-16204 evaluation of this action resulted in the following recommendation: "Securing one HPSI pump before transfer to recirculation is not considered risk beneficial due to the risk of core damage upon single failure loss of the one operating HPSI pump during a small break LOCA." Note that there is minimal benefit (small decrease in RWST drain down rate) derived from this action.

This evaluation was performed for the Combustion Engineering (CE) designed plants only. Results of the LOCA cases analyzed in Appendix B of WCAP-16204 show that "clad surface

temperatures would reach unacceptable values if all SI flow is shutoff for about 10 minutes and is not turned back on within this time frame. This is a very short time for relying on plant operators under stressful conditions to restart the SI flow so as to bring the core temperatures down to acceptable values." For a small break LOCA, high-head injection is essentially "all SI flow" because of the prevailing RCS pressure.

At Indian Point, two (of three) SI pumps are required to operate during the injection and recirculation phases of safety injection. Three SI pumps are provided to account for an active component failure. The SI pumps may be sequentially stopped per Indian Point EOP ES-1.2, "Post LOCA Cooldown and Depressurization", which provides actions to cooldown and depressurize the RCS to reduce break flow, thereby reducing the injection flow necessary to maintain RCS subcooling and inventory. The SI pumps are sequentially stopped based on pre-established criteria that maintain core cooling, resulting in less outflow from the RWST. For smaller LOCAs, it is possible to cooldown and depressurize the RCS to cold shutdown conditions before the RWST is drained to the switchover level.

Therefore, the SI pumps may be manually stopped prior to recirculation alignment only in accordance with the current guidance for SI reduction provided in EOP ES-1.2. No further actions associated with this COA will be implemented at Indian Point.

NRC RAI Question #3

NRC Bulletin 2003-01 provides possible interim compensatory measures licensees could consider to reduce risks associated with sump clogging. In addition to the compensatory measures listed in Bulletin 2003-01, licensees may also consider implementing unique or plant-specific compensatory measures, as applicable.

d. Provide a discussion of any possible unique or plant-specific compensatory measures being considered for implementation at IP2 and 3.

e. Discuss the basis for rejecting any of the additional compensatory measures that were considered.

Response to NRC Question 3

As stated in the original response to Bulletin 2003-01, IP 2 and 3 currently have foreign material control programs that are applicable to containment. The containment closeout procedures in OAP-007, Containment Entry and Egress, have been revised as described in the 60 day response to Bulletin 2003-01. The revisions include quantified inspection criteria to ensure the floor plates, gratings, and sump screens are free of adverse gaps and breaches, and checks for clear drain troughs leading to the sumps. In addition, VC sump blockage controls have been developed and included in the foreign material control procedure IP-SMM-MA-118 and in OAP-007. Maintenance procedures for Fan Cooler IP (FCU) work were also revised to include specific precautions regarding containment foreign material and housekeeping controls and their potential impact on VC ECCS sumps, especially when FCU waterbox and FCU motor cooler cleaning is performed during power entries. In September 2003, Maintenance completed a focused self assessment of the IPEC FME process effectiveness.

Interim compensatory measures have been considered, as documented in the responses to RAI #1 and #2.

Additionally, both Units have the plant specific design feature of two separate recirculation flow paths (each with an independent sump). This sump feature provides for additional flexibility and redundancy. The EOPs already include guidance for use of both flow paths, as appropriate.

The review performed for Bulletin 2003-01 did not consider any other unique or plant specific design features or compensatory measures.

ATTACHMENT 2 TO NL-04-151

Commitments In RAI Response Regarding Bulletin 2003-01, "Potential Impact of Debris Blockage On Emergency Sump Recirculation At Pressurized Water Reactors" (TAC Nos. MB9582 and MB9583)

ENO NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNITS 2 AND 3
DOCKETS 50-247 AND 50-286

No.	Commitment	Date
1	A1a-W - Indian Point will perform an evaluation of actions to stop one of two operating containment spray pumps early in the LOCA recovery (in EOP E-1), with containment pressure above the spray signal reset pressure and decreasing. This evaluation will consider the complete interruption of spray flow due to a failure of the active spray pump, with subsequent operator action to restart a spray pump. Generic analyses detailed in WCAP-16204 determined that, if a spray pump is restarted within 10 minutes after failure of the running pump, containment pressure and temperature will remain below assumed limits for the reference plant. The Indian Point evaluation will determine if the WCAP-16204 analysis is bounding with regard to containment pressure and temperature values in the plant-specific analysis of record, and will determine if plant-specific dose analysis assumptions can be satisfied with a temporary interruption of spray flow. Although the iodine removal mechanisms currently differ between the units (IP 2 requires spray operation for iodine removal whereas IP 3 also credits charcoal in the fan coolers for iodine removal), the evaluation will be performed assuming the alternate source term amendment is approved and the FCU charcoal is no longer in the licensing basis for iodine removal.	March 25, 2005
2	If the A1a-W evaluation demonstrates that a temporary interruption of spray flow is acceptable, EOP E-1 (both units) will be revised to include an action to stop a containment spray pump, if both are running and an adequate number of fan coolers are operating (based on containment pressure value and trend). This action will be consistent with the example provided in ERG Maintenance Item DW-03-018, with plant-specific modifications as necessary to ensure dose analysis assumptions are met.	May 23, 2005
3.	Training for A1a-W procedure changes	Next practicable training cycle
4	A3-W - In order to address the issue of flow through the recirculation sump with the potential for additional debris entrainment on the sump screens, Indian Point EOP ES-1.3 (both Units) will be revised to include additional guidance regarding starting or stopping the second recirculation pump. This guidance will consider the need to supplement recirculation flow, to maintain adequate core cooling and recirculation spray if necessary.	April 28, 2005
5	Necessary procedure revisions per A3-W will be made in about 8 weeks after the engineering evaluation.	June 23, 2005
6	Training for A3-W procedure changes.	Next practicable training cycle

7	A5 - In order to provide additional assurance that a supply of borated water will be available in the event recirculation capability is unavailable due to sump blockage, both Units will include actions to establish makeup to the RWST in EOP ES-1.3, "Transfer to Cold Leg Recirculation", after the last pump taking suction from the RWST is stopped and isolated from the tank. Note that injection of this additional water into the RCS or containment will not be directed unless sump recirculation capability is lost. Actions to provide additional makeup flow to the RCS from a borated water source, after loss of recirculation capability due to sump blockage, will be included in the new Indian Point procedure for response to sump blockage. Development of this procedure is included in COA A9-W, "Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation". This procedure will be revised in about 8 weeks after the results of COA A9-W identify a strategy for use of the water. A8-W - To support implementation of a revised procedure for response to sump blockage (per COA A9-W), steps directing the operator to monitor for indications of sump blockage will be added to Indian Point EOP ES-1.3, "Transfer to Cold Leg Recirculation", and EOP ECA-1.1, "Loss of Emergency Coolant Recirculation" (both IPs). These steps will be based on the example provided in ERG Maintenance Item DW-03-018. The plant-specific indications discussed above will be determined following an evaluation of the instrumentation available at Indian Point. The available instrumentation will be assessed for adequacy in diagnosing sump blockage using, in part, guidance provided by the SBCRG Background Information. This assessment will determine the optimal indications to use for identifying a sump blockage condition, to minimize the potential for misdiagnosis by providing clear definitive setpoint/trending parameters. A9-W - In order to enhance recovery from a sump blockage event, plant-specific guidance for response to containment sump blockage will be developed, based on the generic guideline SBCRG, "Sump Blockage Control Room Guideline". This will be a plant-specific equivalent (both IPs) of the guidance provided in the SBCRG. In order to develop this guidance, engineering evaluations are required to establish the effects of adding additional inventory to the RCS/Containment and any limitations on this action.	April 28, 2005
8	Necessary procedure revisions for WCAP 16204 items A5, A8-W and A9-W will be made after the engineering evaluation.	June 23, 2005
9	Training for procedure revisions for WCAP 16204 items A5, A8-W and A9-w will be conducted.	Next practicable training cycle