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Fred Dacimo
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January 28, 2005

Re: Indian Point Unit 3
Docket No. 50-286
NL-05-013

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: **Reply to RAI Regarding Indian Point 3 Amendment Application For Alternate Source Term (TAC MC 3551)**

Reference:

1. Entergy letter NL-04-068 to NRC, " Proposed Change to Technical Specifications Regarding Full Scope Adoption of Alternate Source Term", dated June 2, 2004

2. NRC letter from Milano to Kansler Dated 01/13/05, Indian Point Nuclear Generating Unit No 3- Request For Additional Information Regarding Amendment Application For Alternate Source Term (TAC No MC3351) (Internal Ref; RA-05-002)

3. Entergy letter NL-05-004 to NRC, "ABS Consulting Report R-1109298-01, Analysis of Control Room χ/Q Values for Releases at Indian Point Generating Station Unit 3 Using ARCON96 Computer Code.", dated June 5, 2005

4. Entergy letter to NRC, NL-04-069, "Proposed Changes to Technical Specifications: Stretch Power Uprate (4.85%) and Adoption of TSTF-339", dated June 3, 2005

Dear Sir:

This letter provides Entergy Nuclear Operations, Inc. (ENO) response, Attachment 1, to the NRC request for additional information (Reference 2) regarding an ENO letter requesting a Technical Specification change, respectively (Reference 1). This reply includes additional information requested by NRC during teleconference on January 24, 2005, specifically the quantitative argument regarding "string" distance from airlock vs plant vent to CCR HVAC intake and the verification of the required pressure for the blow out panels.

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In addition, Attachment 2 provides the revised ABS Consulting Report R-1109298-01, Revision 3 dated January 24, 2005, "Analysis of Control Room χ/Q Values for Releases at Indian Point Generating Station Unit Number 3 Using ARCON96 Computer Code". This revised report supersedes the report previously submitted on January 5, 2005, (Reference 3)

Attachment 3 contains errata pages for Indian Point Nuclear Generating Unit 3 Alternate Source Term June 2, 2004 Submittal based on new χ/Q Values contained in Attachment 2.

Attachments 4 and 5 contain errata pages based on new χ/Q Values contained in Attachment 2 for the Stretch Power Uprate Licensing Report transmitted in the original IPEC-Unit 3 License Amendment Request dated June 3, 2004. (Reference 4). A Table summarizing the changes is provided. Attachment 4 pages are for the proprietary version (WCAP-16212-P) and Attachment 5 pages are for the non-proprietary version (WCAP-16212- NP). Since there is no proprietary information on any of these pages, an application for withholding is not required for these replacement pages.

The additional supporting information and errata pages provided in this letter do not alter the conclusions of the no significant hazards evaluation that supports the subject license amendment requests. There are no new commitments being made in this submittal. If you have any questions or require additional information, please contact Mr. Patric Conroy at (914) 734-6668.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 01/28/05.

Sincerely,

Fred R. Dacimo
Site Vice President
Indian Point Energy Center

Attachment 1: Reply to RAIs Regarding Amendment Application For Alternate Source Term (Ref: Letter from Milano to Kansler Dated 01/13/05)

Attachment 2: Revised ABS Consulting Report R-1109298-01, Revision 3 dated January 24, 2005, Analysis of Control Room χ/Q Values for Releases at Indian Point Generating Station Unit Number 3 Using ARCON96 Computer Code.

Attachment 3: Errata Pages For Indian Point Nuclear Generating Unit 3 Alternate Source Term June 2, 2004 Submittal

Attachment 4: Errata Pages for WCAP-16212-P Indian Point Nuclear Generating Unit 3 Stretch Power Uprate NSSS and BOP Licensing Report, June 3, 2004 Submittal

Attachment 5: Errata Pages for WCAP-16212-NP Indian Point Nuclear Generating Unit 3 Stretch Power Uprate NSSS and BOP Licensing Report, June 3, 2004 Submittal

cc: next page

cc: Mr. Patrick D. Milano, Senior Project Manager
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Resident Inspector's Office
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Mr. Peter R. Smith, President
New York State Energy, Research
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Mr. Paul Eddy
New York State Dept. of Public Service

ATTACHMENT 1 TO NL-05-013

Reply to RAIs Regarding Amendment Application For Alternate Source Term
(Ref: Letter from Milano to Kansler Dated 01/13/05)

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

Reply to RAIs Regarding Amendment Application For Alternate Source Term
(Ref: Letter from Milano to Kansler Dated 01/13/05)

NRC RAI Question #1
Provide the justification for using the containment vent χ/Q values to model the following release pathways:

a. Emergency core cooling system (ECCS) leakage in the auxiliary building for the large-break loss-of-coolant accident (LOCA) radiological analysis.

b. Fuel storage building ventilation system releases for the fuel-handling accident (FHA) radiological analysis.

c. Failed volume control tank leakage for the volume control tank rupture radiological analysis.

Response to Question 1a:
The Primary Auxiliary Building ventilation system exhausts through the Containment vent.

Response to Question 1b:
The Fuel Storage Building ventilation system exhausts through the Containment vent.

Response to Question 1c:
The Volume Control Tank is in the PAB which, as noted in the response to 1a, exhausts through the Containment vent.

NRC RAI Question #2
Provide the justification for using the auxiliary boiler feed building (ABFB) fans χ/Q values to model the following release pathways:

a. Steam generator releases for the small-break LOCA and main steam line break (MSLB) radiological analyses.

b. Condenser, atmospheric dump valve (ADV), and/or main steam safety valve (MSSV) releases for the steam generator tube rupture (SGTR), rod ejection, and locked rotor radiological analyses.

Response to Question 2a:
The Auxiliary Boiler Feed Pump Building fan area X/Q, as used in the original LAR submittal, is bounding and conservative with respect to all release points in that area. Specifically, the release points that have been evaluated are (1) the ADV Silencers, (2) the rooftop "organ pipes" from MSSV and (3) the southern side of the building closest to the Control Building air intake. In all three cases, the resultant X/Q factors are lower than those originally chosen. This is shown in a revised version of the ABS X/Q Report, attached to this document.

Response to Question 2b:
With respect to the condenser, all secondary side radioactive gases associated with the SGTR analysis are assumed to be released through the Aux Boiler Feed Pump Building. This is a conservative assumption, since the ABFP Building is closer to the Control Building than the condenser is. IP3 maintains an Air Ejector autodivert function to Containment, actuated on high radiation signal, but this function is neither modeled nor credited in the analysis.

With respect to the ADV and MSSV releases for the identified scenarios, the ABFP fan location, as noted in the response to Question 2a, is bounding for releases from the ADVs and MSSVs.

NRC RAI Question #3
Provide the justification for using the ABFB side χ/Q values to model ADV and/or MSSV leakage for the MSLB radiological analysis.

Response to Question 3:
The MSLB radiological analysis modeled the ABFB fans for releases from the intact steam generator. For the ADVs and the MSSVs, the most limiting release point is the ADV silencers. However, as noted above, the χ/Q for the ABFP Building fan location is higher, and therefore more conservative, than that of the ADV silencers.

The MSLB radiological analysis assumes the southern side of the ABFP building as the release point for the faulted steam generator. For the limiting steam break accident, the pressure within the building exceeds 3.0 psig within about ten seconds, which exceeds the sheet metal wall failure pressure of 1.26 psig.

Finally, the analysis conservatively assumes that only the south wall panels in the ABFP Building fail, which maximizes the release in the direction of the Control Building

NRC RAI Question #4
Section 11.1.4 states that the FHA radiological analysis supports refueling operation with the equipment hatch and personnel air lock remaining open because no filtration or containment isolation was modeled. However, the containment vent χ/Q values used to model the FHA radiological analysis may not bound χ/Q values resulting from either an equipment hatch or personnel air lock release.

Response to Question 4:
The Containment equipment hatch faces nearly 180 degrees away from the Control Building and was therefore not considered to be a limiting location for CR dose subsequent to a Fuel Handling Accident. To confirm this, a minimum-distance path evaluation was performed. This evaluation takes into account the location of the equipment hatch, its shape, and the blocking effects of the buildings that stand between the equipment hatch and the Control Room intake.

Several possible paths for the stretched string path from the Equipment Hatch to the Control Room Intake were considered. The shortest stretched string path is from the edge of the Equipment Hatch to the edge of the opening in the Missile Shield, from there to the SE corner of the Missile Shield, and then in a straight horizontal line to the control room intake. Vertically, this line goes horizontally through the Missile shield at 101.5', up to the top of the Fuel Storage

Building at the North edge at 139', down over the West edge also at 139', over the South edge of the Fan House at 111', over the West edge of the Auxiliary Building at 73', and down to the top of the Electrical Tunnel at 31', and then to the Control Room Intake at 25.5'. Only the edges where the string touches are listed. The stretched string distance for this path is 106.6 m, as compared to 103.8 m for the slant distance to the containment vent. Thus, doses calculated using the χ/Q values for the Containment Vent are conservative for releases through the Equipment Hatch.

The 80' personnel airlock in Containment leads into the Primary Auxiliary Building. The PAB ventilation system, as previously noted, exhausts to the Containment vent. The 95' personnel airlock is located in the equipment hatch and is addressed by the discussion of the equipment hatch.

Therefore, the containment vent χ/Q values used to model the FHA radiological analysis bound the χ/Q values resulting from either an equipment hatch or 95' personnel air lock release.

Note: The NRC staff has the following questions regarding Attachment I, "ABS Consulting Report R-1109298-01, Analysis of Control Room χ/Q Values for Releases at the Indian Point Generating Station Unit Number 3 Using the ARCON96 Computer Code," to the January 5 letter:

NRC RAI Question #5

Describe in more detail the assumptions used to model the initial plume dimensions for each of the release pathways. In particular, explain the derivation of the containment surface, containment vent, and ABFB initial σ_z plume dimensions. Are the containment vent and ABFB fans oriented so flow is in a horizontal direction?

Response to Question 5:

The containment surface σ_y and σ_z values were determined by dividing the containment height and diameter by 6. Originally, the containment vent bird screen was mistakenly orientated vertically (a horizontal release). When the drawings were re-examined, it was determined that the release was vertical from the top of the vent. The ARCON96 results were recalculated using the top of the vent as the release height, σ_y equal to $1/6^{th}$ the vent outlet width, and σ_z set to zero. The ABFB side release had the σ_z set to $1/6^{th}$ of the total height of the panels that would be expected to blow out on the south side of the ABFB. The width was the average width of these panels, determined as the total area divided by the total height. This value was then multiplied by the cosine of the angle between the perpendicular to the panels and the horizontal line of sight between the release point and the control room intake, and $1/6^{th}$ of that value was used for σ_y for that case. The ABFB fans are no longer reported by ABS in Attachment 2 to this letter, and were replaced by the ABFB Atmospheric Dump Valve Silencers and the ABFB Safety Valve Organ Pipes, both of which were modeled as point sources.

NRC RAI Question #6
Explain how the source and receptor grid locations listed in Table 1 were used to generate the ARCON96 geometric input data listed in Table 2. For example:

a. According to the grid coordinates presented in Table 1, the ABFB appears to be located south of the control room (CR) intake since its north coordinate (5742.6 ft) is less than the CR intake north coordinate (5783.8 ft). However, Table 2 shows than the direction from the CR intake to the ABFB is towards the north (15°–16°).

b. According to the grid coordinates presented in Table 1, the distance between the ABFB should be 91 feet (28 meters):

$$\sqrt{(5742.6 - 5783.8)^2 + (1395.1 - 1476.0)^2} \quad = \quad 90.8\ ft \quad = \quad 28\ m$$

However, Table 2 shows that the distance between the ABFB and the CR intake is 65 meters.

Response to Question 6:
The coordinate values for the ABFB were transcribed incorrectly from the spreadsheet where the calculations were performed for the report. The coordinates should have been (1394.1E, 5981.8N). In addition, the release point for that case was moved in the reanalysis (Attachment 2), and is now (1410.1E, 5991.7N). The distance is determined using the Pythagorean theorem,

$$d \quad = \quad \sqrt{(x_s - x_i)^2 + (y_s - y_i)^2}$$

where the source is located at (x_s,y_s) and the intake is located at (x_i,y_i). The angle from the intake to the source, measures clockwise from north, is given by:

$$\theta \quad = \quad \tan^{-1}\left(\frac{y_s - y_i}{x_s - x_i}\right) + \alpha$$

where α is the adjustment from plant north to true north, 38.5611°. In all of the above, the x-coordinate is measured East of the reference, and the y-coordinate is North of the reference. Care must be taken to put θ in the correct quadrant so that it shows the intake to source angle, rather than the reverse.

NRC RAI Question #7
Confirm that the area source χ/Q values presented in Table 5 represent the limiting source/receptor pairs and scenarios for each accident. The following list provides examples of other conditions that might result in higher χ/Q values.

a. Releases from other possible locations such as penetrations, open doors, other vents or openings, outdoor dump valves, etc.

b. A change in release characteristics or location due to single failure or loss of offsite power (LOOP).

c. Intake at locations other than the control room air intake (e.g., due to unfiltered inleakage, or a need to use a technical support center).

Response to Question 7a:

IP3 has no outdoor dump valve, and the Containment penetrations are sealed and pressurized, so it is not reasonable to consider these openings as possible release paths. For each analyzed accident, all of the radiation dose to the Control Room operators is presumed to come from one or more of the locations identified in the original (or, by extension, the revised) X/Q report: the Containment vent, the Containment building, and the three points in the vicinity of the Aux Boiler Feed Pump building.

Response to Question 7b:

The release characteristics would not change as a result of LOOP or single-failure loss, as these possibilities have already been considered in the radiological dose analysis.

Response to Question 7c:

At this time, IP3 is undertaking a Tracer Gas Testing Program to quantify the unfiltered inleakage rate. Entergy anticipates that the testing may identify the most significant sources of unfiltered inleakage.

In response to this question, χ/Q factors for the 53' elevation of the Control Building were re-evaluated conservatively assuming that the unfiltered inleakage entered the Control Room through the solid concrete wall on the building's north side. (Realistically, inleakage would be expected to come from the door connecting the CR to the Turbine Hall or through the CR floor at the instrument racks.) The air intake for the HVAC Equipment Room is co-located with the intake for the Control Room HVAC System. Unfiltered in-leakage through ducts in the room would therefore still use the same location as the intake analysis.

For all accidents releasing exclusively through the Containment vent or the Containment Building, the χ/Q factors were lower, due to the greater distance from the release points.

For accidents releasing from the Aux Boiler Feed Pump building wall or ADV silencers, the χ/Q values were found to be lower than those assumed in the original analysis, due to the conservative margins established in the original χ/Q model. However, releases from the MSSV "organ pipes" resulted in higher χ/Q factors than those assumed in the original analysis.
Those accidents that include release components through the organ pipes are SB-LOCA, Rod Ejection, Locked Rotor and Steam Generator Tube Rupture. The first two accidents result in lower CR doses because the increase in χ/Q for organ pipe releases is more than compensated by the decrease in χ/Q from the Containment release points. For Locked Rotor, the increase in χ/Q for organ pipe releases is more than compensated by the decrease in χ/Q from the ADV silencers. For the SGTR, the maximum possible dose increase would bring the currently reported 2.2 rem TEDE to <2.8 rem TEDE based on the conservative assumption that all releases for the first two hours are through the organ pipes. A dose of 2.8 rem TEDE remains well below the 5.0 rem limit.

NRC RAI Question #8

Page 7 states that the release from the ABFB fans was assumed to be at the center of the fan group based upon a weighted average of flow. Will all fans run at their design flow rate under all conditions (e.g., single failure, LOOP) during an accident? If not, what is the impact on the assumption regarding the release location?

Response to Question 8:

The Aux Boiler Feed Pump fan locations were selected as a general release area for all release points from the building. As noted above, when the three specific release points were individually evaluated (i.e., ADV silencers, organ pipes and building south wall), all were found to have lower X/Q values than those of the fan locations. The radiological dose analysis did not assume functionality of the fans during any accident.