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JUN 21 2016

LR-N16-0041

Order EA-13-109

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

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Hope Creek Generating Station's Request for Relaxation from the Hardened Containment Vent Release Point Height Requirement of NRC Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)

References:

1. NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013

2. NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," dated September 1, 1989

3. PSEG Letter LR-N15-0257, "Hope Creek Generating Station's Phase 1 and Phase 2 Overall Integrated Plan and Third Six-Month Status Report (Phase 1) in Response to June 6, 2013 Commission Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions (Order Number EA-13-109)," dated December 28, 2015

4. NRC Letter to PSEG, "Hope Creek Generating Station – Interim Staff Evaluation Relating to Overall Integrated Plan in Response to Phase 1 of Order EA-13-109 (Severe Accident Capable Hardened Vents) (TAC NO. MF4458)," dated February 12, 2015

On June 6, 2013, the Nuclear Regulatory Commission (NRC) issued Order EA-13-109 (Reference 1) to all licensees that operate boiling-water reactors (BWRs) with Mark I and Mark II containment designs. The Order was effective immediately and requires the Hope Creek Generating Station (HCGS) to install a reliable hardened venting capability for pre-core damage and severe accident conditions. NRC Order EA-13-109 consists of two phases: Phase 1 requires reliable, severe accident capable wetwell venting; Phase 2 requires either a reliable, severe accident capable drywell vent system or a reliable containment venting strategy that makes it unlikely to need to vent from the containment drywell during severe accident conditions. This letter transmits PSEG's request for relaxation of Phase 1 Requirement 1.2.2 in Attachment 2 of NRC Order EA-13-109, which states:

> "The HCVS shall discharge the effluent to a release point above main plant structures."

PSEG installed a Hardened Torus Vent (HTV) in response to NRC Generic Letter 89-16 (Reference 2). The HTV release point elevation is 148 feet above grade elevation at the HCGS Reactor Building and approximately 54 feet below the top of the Reactor Building dome. The HCGS design is unique among Mark I and II BWRs in that its Reactor Building has an oblate concrete dome. The vent pipe release point is above adjacent structures except for the Reactor Building dome. Based on consideration of the design changes that would be needed to achieve full compliance with the HTV release point height requirement of the Order, and favorable atmospheric dispersion characteristics of the HTV at its current release point elevation, PSEG considers the requested relaxation to be appropriate in lieu of verbatim compliance.

In accordance with Section IV of NRC Order EA-13-109, PSEG requests the Director, Office of Nuclear Reactor Regulation to relax Phase 1 Requirement 1.2.2 in Attachment 2 of the Order for the reasons provided in Attachment 1 to this letter. HCGS is required to implement the Phase 1 requirements of NRC Order EA-13-109 prior to startup from the fall 2016 refueling outage, and PSEG requests that the relaxation be granted in a time frame consistent with the schedule requirements of the Order.

This request for relaxation addresses the open item identified as Overall Integrated Plan (OIP) Item 3 and Interim Staff Evaluation (ISE) Item 13 (References 3 and 4). There are no regulatory commitments contained in this letter. If you have any questions or require additional information, please do not hesitate to contact Mr. Brian J. Thomas at 856-339-2022.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 21, 2016
(Date)

Sincerely,

Paul J. Davison

Paul J. Davison
Site Vice President
Hope Creek Generating Station

Attachment 1: Hope Creek Generating Station's Request for Relaxation from the Hardened Torus Vent Release Point Height Requirement of NRC Order EA-13-109

cc: Mr. Daniel Dorman, Administrator, Region I, NRC
Ms. Carleen J. Parker, Project Manager, NRC/NRR/DORL
Mr. Justin Hawkins, NRC Senior Resident Inspector, Hope Creek
Dr. Rajendra Auluck, Sr. Project Manager NRC/NRR/JLD
Mr. Patrick Mulligan, Chief, NJBNE
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator
Mr. Lee Marabella, PSEG Corporate Commitment Coordinator

## Attachment 1

## Hope Creek Generating Station's Request for Relaxation from the Hardened Torus Vent Release Point Height Requirement of NRC Order EA-13-109

References in this attachment are listed in Section 5.

## 1. Relaxation Request

In accordance with Section IV of NRC Order EA-13-109 (Reference 1), PSEG hereby submits a relaxation request for the Hope Creek Generating Station (HCGS), from the Order requirement to discharge the Hardened Containment Vent System (HCVS) effluent to a release point above main plant structures.

HCGS is required to comply with the Phase 1 requirements of NRC Order EA-13-109 prior to startup from Refueling Outage 20 (H1R20) in fall 2016. Absent the requested relief, full compliance would require an extension of the existing Hardened Torus Vent (HTV) release point's height from its current location at plant elevation 250 ft., to an elevation greater than 304 ft., 3 in.

The requested relaxation would enable PSEG to maintain the existing HTV release point at its current elevation, with a modification to orient the discharge in the vertical and upward direction. The existing HTV was installed in response to NRC Generic Letter 89-16 (Reference 2), and its release point is 148 ft. above grade level at the HCGS Reactor Building. The release point is above adjacent plant structures with the exception of the Reactor Building dome.

## 2. Order Requirement from which Relaxation is Requested

PSEG requests relaxation of Phase 1 (wetwell venting) Requirement 1.2.2 in Attachment 2 of NRC Order EA-13-109, which states:

> "The HCVS shall discharge the effluent to a release point above main plant structures."

NRC Interim Staff Guidance documents JLD-ISG-2013-02 (Reference 3) and JLD-ISG-2015-01 (Reference 4), endorse the use of the NEI 13-02, Revision 1 (Reference 5), as a means of meeting NRC Order EA-13-109. The requested relaxation also involves alternatives to NEI 13-02 guidance specific to the vent release point height, i.e., for the release point to be at least 3 ft. above the roof and related structures of the building from which the vent emanates, and the recommended minimum horizontal distance of 25 ft. between the vent release point and adjacent structures.

## 3. Justification for Relaxation Request

PSEG's proposed alternative to full compliance with NRC Order EA-13-109 is to maintain the current elevation of the HTV release point, with a modification to change the release point's orientation from horizontal to vertical in the upward direction. The requested relaxation is justified by the atmospheric dispersion provided by the HTV at its current elevation, and by avoiding adverse effects on HTV performance that would result from extending the height of the release point to achieve full compliance with NRC Order EA-13-109.

Under severe accident conditions, the main purpose of the vent is to protect the containment function. The release point height requirement of NRC Order EA-13-109 is concerned with providing effective atmospheric dispersion during venting. The ability to maintain the containment function during severe accident conditions takes precedence over an incremental improvement in atmospheric dispersion that would result from a fully compliant HTV. A compliant release point height would require the addition of more than 54 ft. of piping to the existing HTV, which would increase pressure drop and reduce the margin in containment pressure gained by venting. As an alternative to extending the height of the release point, this relaxation request shows favorable atmospheric dispersion for the current elevation via mechanistic evaluation of momentum plume rise. PSEG will improve dispersion by modifying the HTV to provide a vertical, upward discharge. This relaxation request satisfies both goals of maintaining containment venting pressure margin and enhancing the dispersion capability without any extension of the HTV pipe.

Section 3.1 describes NRC-endorsed industry guidance that applies to the HTV release point height. The remainder of Section 3 provides details of the justification for this request based on the following key elements:

1. Use of the HTV at its current elevation offers several advantages compared to design changes to extend the height – Section 3.2.

2. Site meteorology is very favorable – Section 3.3.

3. Plant-specific evaluation of the HTV and comparisons to alternative designs show favorable atmospheric dispersion using the current release point elevation – Section 3.4.

4. HCGS has a unique Reactor Building design which supports atmospheric dispersion at the current release point height and poses challenges for designing and installing a fully compliant vent – Section 3.5.

## 3.1 Guidance Applicable to Release Point Height

As endorsed in NRC Interim Staff Guidance documents JLD-ISG-2013-02 (Reference 3) and JLD-ISG-2015-01 (Reference 4), the requirement for discharging the HCVS effluent to an acceptable release point is addressed in Section 4.1.5 of NEI 13-02, Revision 1 (Reference 5), which includes the following criteria applicable to release point height:

> "4.1.5.2. If the release from HCVS is through a stack different than the plant meteorological stack, the elevation of the stack should meet the following criteria:
>
> 4.1.5.2.1. Be higher than the nearest power block building or structure.
>
> 4.1.5.2.2. The release point should be situated away from ventilation system intake and exhaust openings or other openings that may be used as natural circulation ventilation intake flow paths during a BDBEE (e.g., to prevent recirculation of the releases back into the buildings.)"

Additional guidance for plants such as HCGS, which have a single, independent release pipe per unit, is provided in response to Frequently Asked Question HCVS-FAQ-04 (NEI 13-02 Revision 1, Appendix J). The key HCVS-FAQ-04 criteria regarding release point height and separation distances are as follows:

- The release point should be at least 3 ft. above the roof and related structures of the building, consistent with industry practice for roof vents in order to minimize building and structure effects. This criterion considers the vent's minimal frequency of operation, and the buoyancy and momentum of the effluent plume.
- When venting is performed at low containment pressure to maintain core cooling using FLEX strategies, there is no minimum required exhaust stack exit velocity, since without core damage there will be negligible levels of radionuclides and/or combustible gas in the effluent. Therefore, there is no concern with entrainment of the stack effluent into the roof or downstream recirculation zones associated with airflow around the building.
- During severe accident conditions, an effluent exit velocity of 8,000 fpm is considered to be a "predominant minimum release velocity" to assure that the effluent plume would not become entrained in the recirculation zone of a building. Containment venting at severe accident pressures is predominately a high velocity evolution; for the vast majority of time the effluent will be jetted up beyond the affected building recirculation zone.
- Strict adherence to all available guidance is not considered practical or reasonable for all aspects of the beyond design basis venting operation. At

some point during the venting process, the containment pressure may continue to drop such that effluent flow will be reduced and effluent release velocity may drop below the stated 8000 fpm value.

- Under severe accident conditions the main purpose of the vent is to protect the containment function and use of the vent should not be limited by an effluent release velocity of 8000 fpm (e.g., venting at low pressure may be required to optimize the timing of a release or to optimize a venting strategy). In such cases, the margin in containment pressure gained by venting is more important than dispersion of the effluent.

- HCVS-FAQ-04 also recommends a minimum horizontal distance of 25' between the vent release point and adjacent structures, as a reasonable separation distance based on the ability of the effluent stream to overcome wind effects above the roof.

### 3.2 Advantages to Existing Release Point Elevation

The as-built HTV release point elevation offers several advantages as compared to design changes to extend the height, including:

- The current HTV release point elevation, with a modification to orient the release vertically, provides enhanced dispersion capability via momentum plume rise without compromising the containment venting pressure margin. This simple pipe routing and the lower pressure losses of the current HTV elevation provide a higher exit velocity for a given torus pressure, which increases plume rise from the release point.

- The current HTV release point elevation provides increased venting capacity due to lower line resistance as compared to alternative designs with a higher release point. This design feature helps to maintain containment pressure margin during venting, and facilitates compliance with the Order requirement for an HCVS to be capable of discharging at least 1% of rated thermal power.

- The requested relaxation avoids impact on Reactor Building concrete, HTV piping, and pipe supports. Figure 3 shows a pipe support arrangement associated with a design option to partially increase the height of the release point. A fully compliant vent design would involve additional supports and piping.

- The requested relaxation would minimize work in a challenging environment, resulting in a personnel safety benefit during construction, maintenance, and inspection.

### 3.3 Site Meteorology

The Salem and Hope Creek site has favorable site meteorological characteristics due to its proximity to the Delaware Bay, flat terrain, and absence of tall obstructions in the vicinity of HCGS, as illustrated in Figure 2. Seven years of site-specific hourly meteorological data are used for the atmospheric dispersion and plume rise evaluations. As described below in Section 3.4, site-specific meteorology provides favorable atmospheric dispersion using the current HTV release point elevation.

### 3.4 Plant-Specific χ/Q Evaluations

In order to evaluate alternative HTV release point elevations, PSEG calculated atmospheric dispersion (χ/Q) for the current HTV release point elevation and a fully compliant release point elevation, at seven receptor locations. These evaluations show a gradual, limited improvement (reduction) in χ/Q values as release point elevation is increased, and show effective dispersion from the as-built HTV release point elevation such that a modification to the existing height is not warranted.

#### *3.4.1 Release Point and Receptor Locations*

The evaluated release point heights are as follows:

- El. 250'-0" is the current height of the HTV release point, which is 148' above the grade elevation of the HCGS Reactor Building. The χ/Q evaluations assume implementation of a design change to the existing HTV in order to provide a vertical, upward effluent release. This is PSEG's preferred configuration for which the relaxation is requested.

- El. 307'-3" is three feet higher than the top of Filtration, Recirculation, and Ventilation System (FRVS) exhaust canopy on top of the Reactor Building dome. This elevation complies with the Order requirement and associated guidance, including the HCVS-FAQ-04 recommendation that an elevated release point should be at least three feet above the roof and related structures of the building.

The release points were considered to be located at the same horizontal coordinates, i.e., the 307'-3" elevation release point is assumed to be directly above the as-built 250'-0" release point. PSEG performed χ/Q evaluations from each release point to the seven receptor locations described below in Table 1.

| Table 1 - Receptor Locations for $\chi$/Q Evaluation | | |
|---|---|---|
| **Receptor Location** | **Plant El.** | **Horizontal Distances from HTV to Receptor (Note 1)** |
| 1. HC Control Room (CR) roof door - breathing air supply for CR and Technical Support Center (TSC) during extended loss of AC power | 132' | 310' N<br>150' W<br>344.38' total |
| 2. HC Unit 2 Roof (HCGS FLEX diesel generators) | 132' | 473.46' N |
| 3. HC Service Water (SW) intake structure (FLEX pump water supply) | 102' | 240' N<br>1065' W<br>1091.71' total |
| 4. Salem Canyon (Salem FLEX diesel generators) | 102' | 1203' S<br>165' E<br>1214.26'total |
| 5. Security Center HVAC Intake (Site protected area access control point) | 134'-11" | 390' S<br>675' E<br>779.57' total |
| 6. Salem 2 CR (Safe shutdown Salem Units 1 and 2) | 130'-3-1/2" | 1245' S<br>285' E<br>1277.2' total |
| 7. Salem Technical Support Center (TSC) - (Salem emergency assembly) | 163'-7-1/2" | 1625' S<br>415' E<br>1677.16' total |
| Note 1 – directional distances are referenced to plant north, which is 5.5° west of true north. | | |

These receptor locations are diversely located and cover a variety of directions from the HTV release point. The receptor locations were selected to adequately represent the areas at which personnel access may be required for beyond-design basis (BDB) mitigating strategy implementation.

### *3.4.2 Evaluation Approach and Assumptions*

The $\chi/Q$ evaluations were performed using the NRC-sponsored ARCON96 code, using plant-specific meteorological data and appropriate elements of NRC Regulatory Guide (RG) 1.194 (Reference 6) with the following major inputs and assumptions:

1. Seven years of site-specific, hourly meteorological data

2. 50$^{th}$ percentile $\chi/Q$ values, wind speed, and wind stability. The use of 50$^{th}$ percentile $\chi/Q$ values is reasonable considering that this evaluation is applicable to severe accident conditions for which best estimate values are appropriate (References 7 and 8).

3. The source-to-receptor distance is conservatively assumed to be the shortest horizontal distance between the release point and the intake or receptor location.

4. Minimum wind speed is assumed at 0.5 m/s. This is the default value used in the ARCON96 code and is used for applying low wind speed correction for the calm wind condition. Use of this value is consistent with an acceptable input parameter modeling recommendation in Regulatory Guide (RG) 1.194 (Reference 6, Table A-2).

5. For the prevailing wind for all receptors, the Reactor Building cylindrical section and dome cross section areas will cause wake diffusion for the wind above the box-shaped lower elevation of the building. Cross-sectional surface area information is used as ARCON96 input for all receptor locations to determine the wake diffusion.

6. For zero exit velocity cases: The HTV release is assumed to be a ground-level point source.

7. For cases using exit velocity:

   The HTV release is assumed to be a ground-level point source release and the exhaust from the HTV is assumed to be elevated by a high energy momentum/buoyant release associated with the HTV exit velocity of 8,000 fpm. The release is dispersed horizontally in the downwind direction after the plume reaches the height when the exit velocity becomes less than or equal to the prevailing wind speed and it bends over horizontally in the prevailing wind direction and continues rising until the effluent density becomes equal to or less than the atmospheric air density when the plume vanishes. The bent-over plume rise while buoyancy is the dominant mechanism is conservatively not credited in the plume rise calculation.

It is assumed that the average air density of 1.25E-03 g/cc will be maintained during the entire duration of the accident.

The plume rise is conservatively assumed to be the lower of the plume rise due to momentum or buoyancy.

*3.4.3 χ/Q Evaluation Results*

PSEG calculated the χ/Q values for each combination of release point elevation and receptor location assuming a zero exit velocity, which results in very conservative values for an energetic, vertical release. The most limiting receptor location (i.e., having the highest χ/Q values) is the HCGS CR/TSC air supply, which provides the following results:

| Table 2 - HCGS CR and TSC Air Supply Location χ/Q Values for Zero Velocity Case | | | |
|---|---|---|---|
| **Time Interval (hr)** | **50$^{th}$ Percentile χ/Q Values (sec/m$^3$)** | | **Reduction in χ/Q from EL 250' to EL 307'3"** |
| | **HTV Release Elevation** | | |
| | **250'** | **307'-3"** | |
| 0-2 | 1.02E-04 | 8.42E-05 | 17.45% |
| 2-8 | 8.63E-05 | 7.17E-05 | 16.92% |
| 8-24 | 4.59E-05 | 3.81E-05 | 16.99% |
| 24-96 | 5.35E-05 | 4.43E-05 | 17.20% |
| 96-720 | 5.63E-05 | 4.70E-05 | 16.52% |

The results in Table 2 show a gradual improvement in atmospheric dispersion as release point elevation is increased. These results suggest that an increase in HTV release point height to comply with NRC Order EA-13-019 would result in a limited improvement to post-accident dispersion capability.

PSEG calculated χ/Q values using exit velocities of 8,000 fpm (based on HCVS-FAQ-04) and 14,336 fpm, which is the exit velocity at a relatively low 3 psig torus accident pressure based on plant-specific calculation. These exit velocities provide more realistic dispersion calculations than the zero velocity case because they consider plume rise that would be associated with energetic releases during a severe accident scenario. The exit velocities used for these plume rise evaluations are relatively low for BDB accident venting scenarios. A plant-specific calculation of vent line capacity shows velocities ranging from 14,336 fpm at 3 psig torus pressure to 80,106 fpm at 54.4 psig torus pressure.

PSEG evaluated plume rise and its effect on dispersion using appropriate guidance in RG 1.194 (Reference 6), recognizing that the RG applies to design basis dispersion for control room habitability, and the BDB evaluations for Order EA-13-109 compliance are not subject to all of the RG criteria. PSEG conservatively used portions of RG 1.194

guidance combined with HCVS-FAQ-04 guidance to calculate the plume rise to add to the physical height of the HTV release point in order to obtain an effective HTV height.

PSEG conservatively determined the plume rise by calculating the rise due to buoyancy (RG 1.194 Eq. 12) and the rise due to momentum (RG 1.194 Eq. 13), and selecting the lower of the two values. At 8,000 fpm exit velocity, the momentum plume rise (74.26 ft.) is less than the buoyancy plume rise (94.23 ft.) and is therefore used to determine effective HTV height. Adding the plume rise value of 74.26 ft. to the as-built release point elevation results in an effective HTV height of 324.26 ft., which is 20 ft. higher than the top of FRVS canopy on the Reactor Building dome. This result suggests that the HTV release point at its present elevation and vertical orientation would provide atmospheric dispersion comparable to a fully compliant vent, without extending the HTV pipe and compromising the containment venting pressure margin. At a 14,336 fpm exit velocity, the momentum plume rise would be 99.48 ft., providing an additional 25 ft. of effective HTV height at a reasonably low severe accident torus pressure of 3 psig.

As is the case for the zero velocity results, the receptor location with the limiting χ/Q values for the 8,000 fpm exit velocity case is the HCGS CR and TSC air supply. Table 3 summarizes the results for this location, and shows gradual, limited improvement in dispersion as release point elevation is increased.

**Table 3 - HCGS CR and TSC Air Supply Location χ/Q Values for 8,000 fpm Exit Velocity Case**

| Time Interval (hr) | 50$^{th}$ Percentile χ/Q Values (sec/m$^3$) | | Reduction in χ/Q from EL 250' to EL 307'3 |
|---|---|---|---|
| | HTV Release Elevation | | |
| | EL 250' | EL 307'-3" | |
| | HTV Effective Release Elevation | | |
| | EL 324.26' | EL 381.51' | |
| 0-2 | 7.89E-05 | 6.38E-05 | 19.14% |
| 2-8 | 6.78E-05 | 5.45E-05 | 19.62% |
| 8-24 | 3.59E-05 | 2.93E-05 | 18.38% |
| 24-96 | 4.17E-05 | 3.40E-05 | 18.47% |
| 96-720 | 4.45E-05 | 3.65E-05 | 17.98% |

The plume rise calculation shows that the as-built HTV elevation, without any physical modification to achieve the compliant release elevation, provides a conservative effective HTV release height that compares favorably well to a fully compliant HTV height, including the dispersion enhancement without compromising the containment venting pressure margin.

The conservative nature of the effective release height calculation is supported by comparison to the non-mechanistic χ/Q adjustment allowed by RG 1.194. Section 6 of

RG 1.194 includes the following:

> "In lieu of mechanistically addressing the amount of buoyant plume rise associated with energetic releases from steam relief valves or atmospheric dump valves, the ground level $\chi$/Q value calculated with ARCON96 (on the basis of the physical height of the release point) may be reduced by a factor of 5.
>
> This reduction may be taken only if (1) the release point is uncapped and vertically oriented and (2) the time-dependent vertical velocity exceeds the 95th-percentile wind speed (at the release point height) by a factor of 5."

At the current release point elevation, the vertical velocity at a torus pressure of 3 psig (14,336 fpm or 72.85 m/s) would exceed the best estimate $50^{th}$ percentile wind speed of 10.9 m/s by a factor of 6.68. The non-mechanistic plume rise for an energetic release would result in a plume rise many times the conservatively calculated mechanistic plume rise.

Considering the extremely low probability of a severe accident scenario, the favorable atmospheric dispersion of the HTV at its current elevation, and a marginal benefit associated with a significant modification to the vent height that would be needed for full compliance, PSEG considers the requested relaxation to be justified in that it would not adversely affect plant safety, personnel radiation exposure, or containment venting pressure margin.

### 3.5 Unique HCGS Design

HCGS has a unique design in that it is the only U.S. Mark I or II BWR with a Reactor Building consisting of a rectangular lower section, with a reinforced concrete upper cylindrical section and a dome-shaped top. Figure 1 depicts the HTV release point at the spring line of the Reactor Building dome. The release point is above all other adjacent structures.

The domed portion of the Reactor Building has an oblate shape that is flatter than a hemispherical dome. Specifically, the horizontal distance from the as-built HTV release point at the spring line of the dome to the center of the dome (i.e., the outside radius of the base of the dome) is 85,' whereas the elevation difference between the spring line and the FRVS exhaust canopy at the top of the dome is 54'-3." Plant-specific evaluations of atmospheric dispersion, summarized in Section 3.4, account for the unique HCGS design by using the specific building geometry as input to the ARCON96 code in order to determine atmospheric diffusion.

The unique HCGS design also poses a challenge for extending the release point height above the top of the dome while maintaining horizontal separation from the FRVS exhaust canopy. Figure 3 shows the pipe support arrangement and resulting impact on the Reactor Building for a design concept to partially extend the release point height.

## 4. Conclusion

The requested relaxation to maintain the current release point elevation offers benefits such as maintaining containment pressure margin; avoiding impact on the Reactor Building structure, system piping and pipe supports; and reduced personnel safety challenges during design change implementation or periodic tests and inspection.

The current HTV release point elevation, with a modification to orient the discharge in the vertical, upward direction, provides enhanced atmospheric dispersion based on plant-specific plume rise evaluations that are appropriate for severe accident scenarios.

The plume rise associated with the predominant minimum vent exit velocity of 8,000 fpm provides an effective release point height above the HVAC canopy on the Reactor Building dome, which is the highest adjacent structure.

## 5. References

1. NRC Order EA-13-109, "Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions," dated June 6, 2013

2. NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," dated September 1, 1989

3. NRC Interim Staff Guidance JLD-ISG-2013-02, "Compliance with Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," Revision 0, dated November 2013

4. NRC Interim Staff Guidance JLD-ISG-2015-01, "Compliance with Phase 2 of Order EA-13-109, Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation under Severe Accident Conditions," Revision 0, dated April 2015

5. NEI 13-02, "Industry Guidance for Compliance with Order EA-13-109," Revision 1, dated April 2015

6. NRC Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," dated June 2003

7. WASH-1400 (NUREG-75/014), "Reactor Safety Study: An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," dated October 1975

8. NUREG-1150, "Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants," dated December 1990

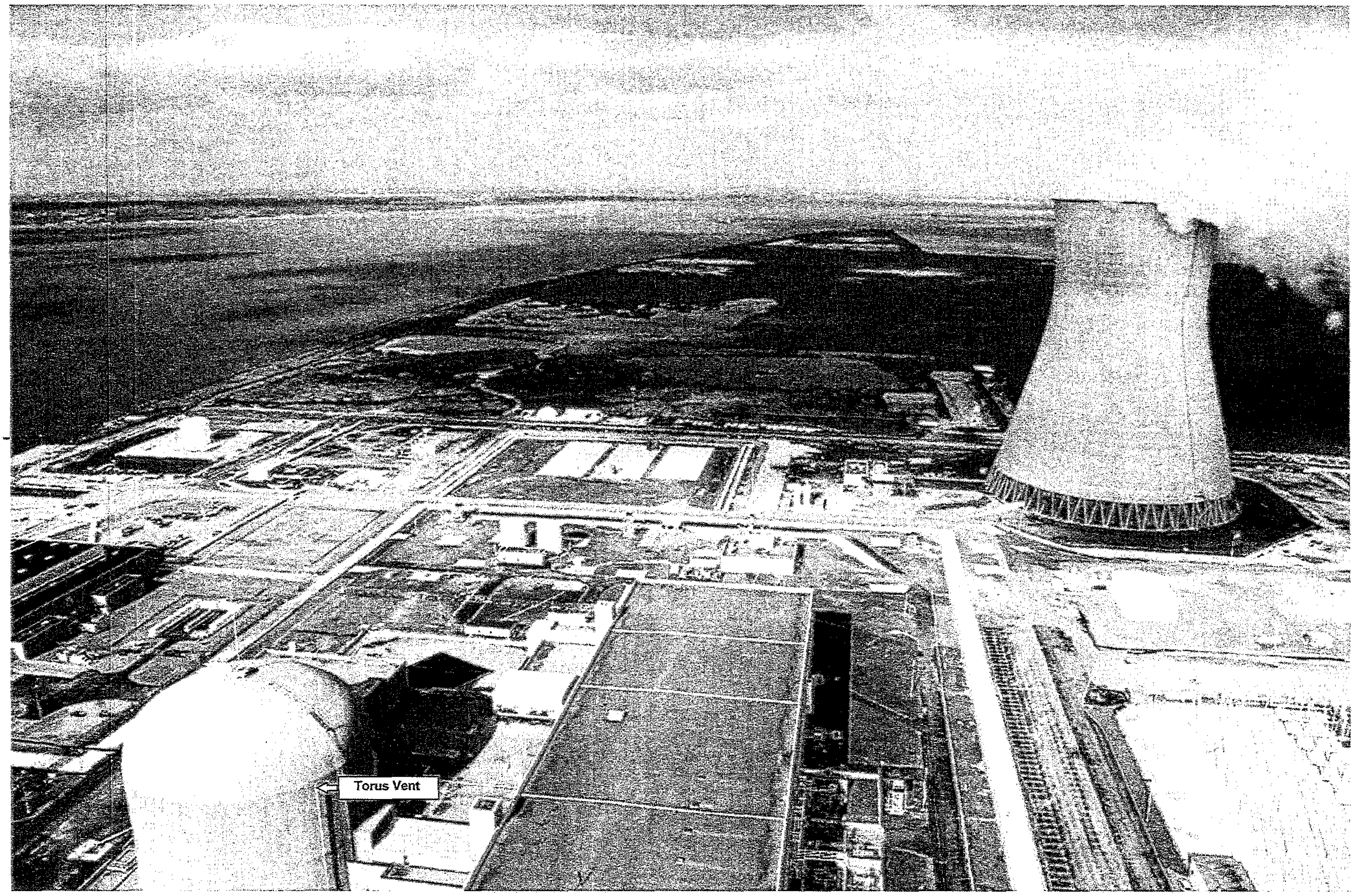


**Figure 1 – Hope Creek Generating Station – Facing North**

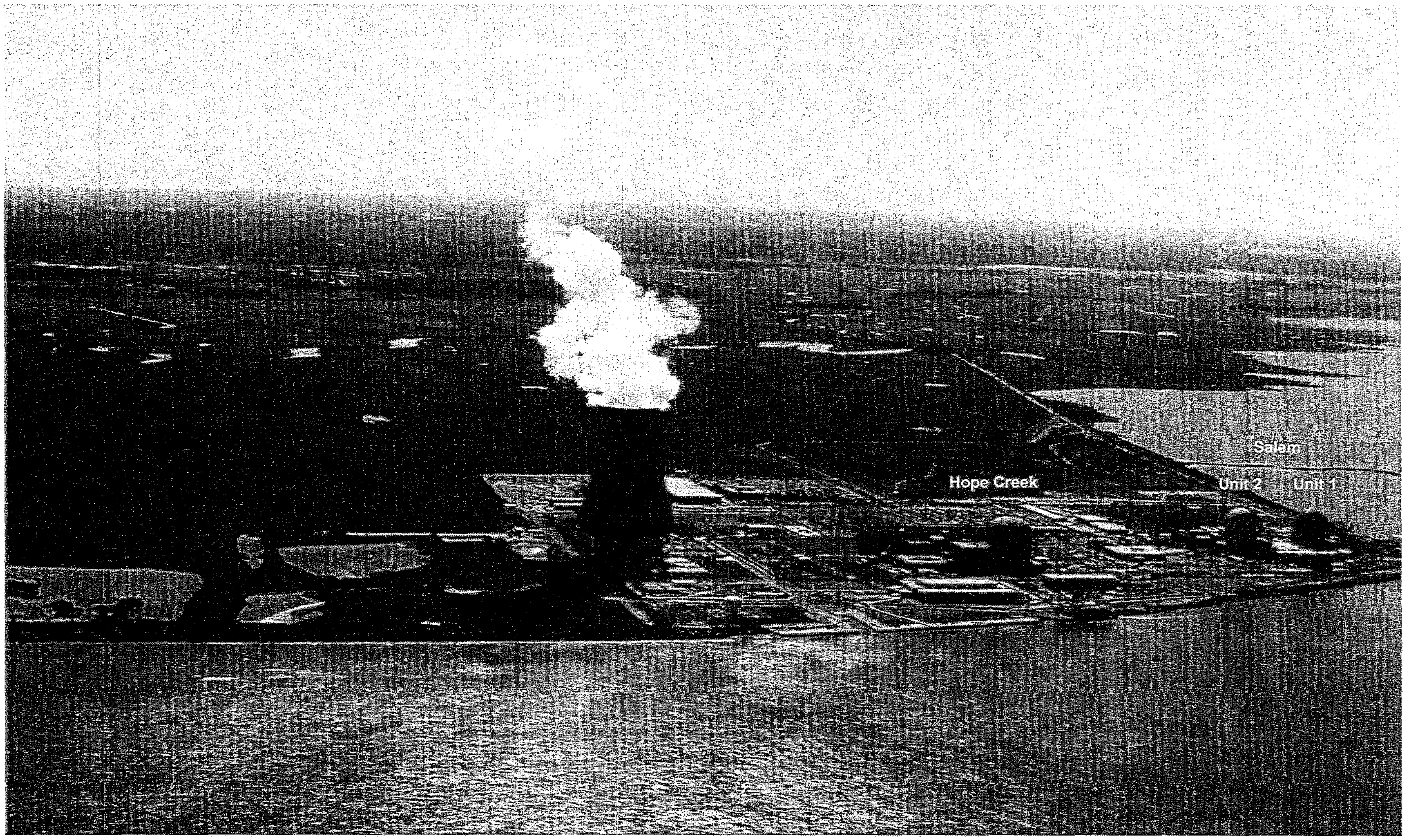


**Figure 2 – Salem / Hope Creek Site – Facing East**

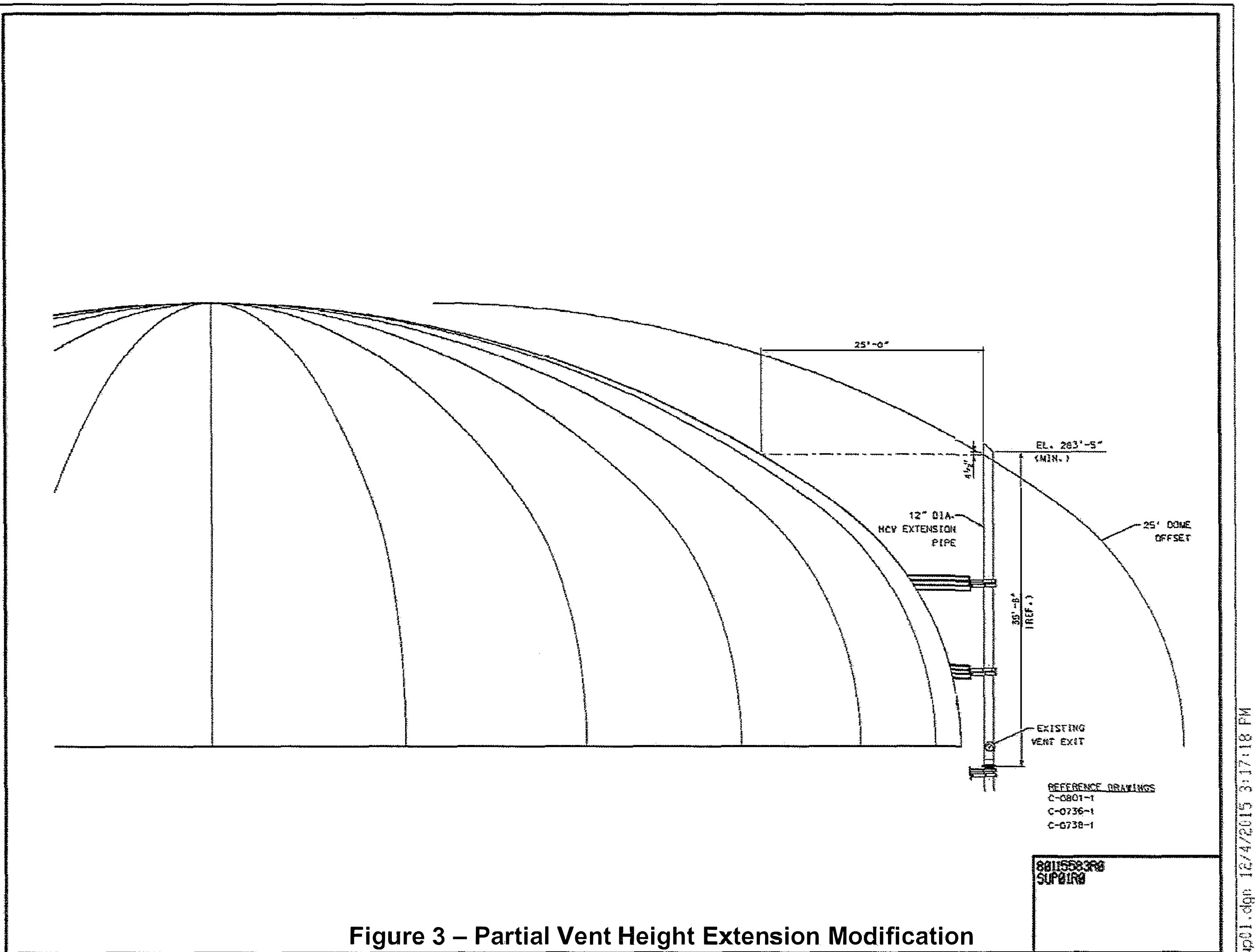


**Figure 3 – Partial Vent Height Extension Modification**