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L-2010-021
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to Request for Additional Information (RAI) Regarding Alternative Source Term Amendment Request (TAC NOS. ME1624 and ME1625)

References:

(1) W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2009-133), "License Amendment Request 196: Alternative Source Term and Conforming Amendment," Accession No. ML092050277, June 25, 2009.

(2) J. Paige (NRC) to M. Nazar, "Turkey Point Units 3 and 4 – Request for Additional Information Regarding Alternative Source Term (TAC Nos. ME1624 and ME1625)," Accession No. ML093500665, December 17, 2009

By letter L-2009-133 dated June 25, 2009 [Reference 1], Florida Power and Light (FPL) requested to amend Facility Operating Licenses DPR-31 and DPR-41 and revise the Turkey Point Units 3 and 4 Technical Specifications. The proposed amendments revise the Technical Specifications to adopt the alternative source term (AST) as allowed in 10 CFR 50.67.

Additional information was requested by the NRC staff by letter dated December 17, 2009 [Reference 2]. The attachment to this letter provides the FPL response to the questions from the NRC staff.

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the State Designee of Florida.

This submittal does not alter the significant hazards consideration or the environmental assessment previously submitted by FPL letter L-2009-133 [Reference 1].

This letter contains no new commitments and no revisions to existing commitments.

Should you have any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager, at (305) 246-7327.

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

Executed on February 10, 2010.

Very truly yours,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

A001
NRR

Attachment:
Response to 12/17/2009 RAI Regarding AST Related Modifications

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Resident Inspector, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

Attachment

Response to 12/17/09 RAI Regarding AST Related Modifications

Response to Request for Additional Information

The following information is provided by Florida Power & Light (FPL) in response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support License Amendment Request (LAR) 196, "Alternative Source Term (AST) and Conforming Amendment," submitted by FPL letter L-2009-133 dated June 25, 2009 [Reference 1].

In a letter dated December 17, 2009 [Reference 2], the NRC staff requested additional structural design information regarding three AST modifications identified in LAR 196. Related conference calls were held between FPL and the NRC technical reviewer on November 23, 2009 and December 3, 2009 to clarify the intent of the questions. During these discussions, FPL indicated that the subject AST modifications were scheduled to be implemented in future Unit 3 and Unit 4 refueling outages, e.g., in spring and fall of 2012, respectively. As such, the information, i.e., margins, design details, descriptions, etc., provided herein are based on the designs that represent the most current design details available. With the exception of AST methodology changes for which FPL is seeking NRC approval, these design changes will conform to the plant's design and licensing basis. Accordingly, these modifications will not require NRC approval prior to implementation as established by 10 CFR 50.59 criteria.

The questions request additional information regarding the three design modifications proposed to support the AST amendment request dated June 25, 2009 [Reference 1]. These are follow-up questions related to NRC's previous RAIs dated August 18, 2009 [Reference 3] and FPL's corresponding response dated August 26, 2009 [Reference 4]. Each of the questions is documented below with the applicable FPL response.

1. ***FPL stated on page 33 of 40 of Enclosure 1 to the June 25, 2009 letter that the Control Room Emergency Ventilation System new air duct intakes will be relocated to different parts of the auxiliary building. The relocated intakes and associated duct work will be designed to current licensing design basis seismic and tornado criteria for this plant, as defined in Updated Final Safety Analysis Report Chapter 5, Appendix 5A, "Seismic Classification and Design Basis for Structures, Systems, and Equipment."***

   a. ***Provide a sketch showing the relocated air intakes and duct work.***

   b. ***Provide the results of the structural analysis of the relocated intake ducts and associated duct work, showing that the maximum stresses meet the design basis acceptance criteria under the safe shut-down earthquake and tornado loading.***

   c. ***Provide the results of the evaluation of the intake ducts and associated duct work for external missile protection.***

   The current Control Room Emergency Ventilation System (CREVS) air intake duct work penetrates the south wall of the mechanical equipment room in the control building where it splits into two lines each with its own isolation damper and air intake. One intake is located approximately 6.5 feet west at the southeast corner of the control building at Elevation 38'-11" while the other intake is located approximately 119.5 feet east on the auxiliary building roof at Elevation 35'-2".

The new air intakes will be located away from the auxiliary building. The existing outside air damper design will be modified from its east-west intake configuration to a parallel configuration feeding a common duct running east over the auxiliary building roof and then splitting into two separate runs to the new southeast and northeast air intakes. One intake is currently planned to be located approximately 298 feet east and 190.5 feet south adjacent to the access and dress facility at Elevation 18'-6" while the other is to be located approximately 328.5 feet north and 350 feet east adjacent to the water treatment area at Elevation 16'-6". All of the positions of the old and new air intakes provided here are relative to the existing CREVS air intake penetration into the control building.

In order to achieve this, the new CREVS air intake duct routing is planned to be run from its penetration in the south wall of the mechanical equipment room along the control building wall and over the auxiliary building roof before splitting into two headers. The southeast header will continue around the Unit 4 containment building over the auxiliary building roof, along the Unit 4 spent fuel building and radwaste building roofs, then underground along the south and east side of the access and dress facility where it ends. The northeast header will continue around the Unit 3 containment building over the auxiliary building roof, along the Unit 3 spent fuel building roof, underground along the Unit 3 containment ramp, under the haul road, along the Unit 4 emergency diesel generator building, splitting into two parallel 12" headers to avoid interferences under the heavy haul road and then recombining into a single header again above ground just south of the water treatment area. See Figure 1 for the planned routing of the southeast and northeast air intakes.

The existing CREVS air intake duct work will be redesigned to remain functional following a tornado missile impact. As previously stated, the following external missiles will be considered for specific segments depending on the routing of the equipment [Reference 4].

a. Corrugated sheet of siding 4'x 8', weighing 100 lbs and traveling at 225 mph
b. Wood decking 12'x 4'x 4", weighing 450 lbs and traveling at 200 mph
c. Passenger car on ground weighing 4,000 lbs and traveling at 50 mph

For sections of the duct work that are not subject to missile impact (e.g., buried ductwork) structural analysis for seismic and tornado wind generated loads has been performed to demonstrate compliance with the applicable design requirements. The results indicate that the duct work will maintain its elastic behavior when subjected to applicable load combinations that include dead loads, accident loads, thermal loads, wind or seismic loads. Furthermore, duct sections designed to withstand the design basis missile impacts will bound the structural analyses for seismic and tornado wind generated loads.

The results of the external missile analyses for the emergency air intake duct work demonstrate that the duct work will comply with the requirements of Class I structures as set forth in Appendices 5A and 5E of the Turkey Point Updated Final Safety Analysis Report (UFSAR) [Reference 5]. For the elevated sections of ductwork, the analyses of the missile impact loads determined that the 12' x 4' x 4" bolted wood decking weighing 450 lbs and moving at 200 mph would be the most limiting missile. Stainless steel ¾" thick 18" OD pipe has high tensile strength, ductility, and durability. Analyses using this material indicate that the limiting missile will not exceed the allowable punching shear stress and preclude breeching of the pipe. The maximum calculated punching shear stress for this material was 41,000 psi compared to the allowable shear stress of 59,000 psi. In addition, sensitivities were run to determine the limiting effective von Mises membrane strain values based on a spectrum of support span lengths. The results indicate that the maximum effective von Mises membrane strains were less than 11% compared to an allowable membrane strain of 12.5%. For sections of ductwork subject to the passenger car missile, additional protection (e.g., bollards, barriers, or enclosures) will be provided to maintain functionality of the ductwork. Based on these results, the duct work will be able to withstand tornado generated design basis missile impact loads with some localized plastic deformation but without loss of functionality. As previously stated, the stress acceptance criteria and resulting margins for the air intake duct work will satisfy the applicable sections of the American Society of Mechanical Engineers (ASME) code, American Institute of Steel Construction (AISC) manual, and Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) manual [Reference 4].

2. ***FPL stated on p. 14 of 20 of Attachment 2 to the Enclosure that it intends to install 10 stainless steel wire mesh baskets (two large and eight small) containing sodium tetraborate decahydrate (NaTB) in the containment basement, as a means of controlling the containment sump pH. These baskets contain a combined mass of 11,061 lbm of NaTB. Provide a detailed description of the structural design and analysis of these baskets, including the location, geometry, anchoring, the design loads and load combinations, design acceptance criteria and margins under normal and accident conditions.***

Turkey Point will be installing ten stainless steel wire mesh baskets per unit containing sodium tetraborate decahydrate (NaTB) to provide a passive mechanism for controlling post-accident containment sump fluid pH without operator action. Post-accident sump pH control is necessary to prevent re-evolution of radioactive iodine suspended in the post-accident sump water and to minimize chloride induced stress corrosion cracking in safety-related austenitic steel structures, systems, and components (SSCs). These modifications are consistent with the radiological consequences analyses used to support the AST LAR submittal.

The basket locations have been chosen such that (1) the baskets will avoid seismic interaction with safety-related SSCs, and (2) the baskets will be out of the zone of influence of any potential High Energy Line Breaks (HELB). Based on the current design, the eight small baskets will be located outside of the biological shield wall (with the exception of basket #8 in Unit 3) while the two large baskets will be located within the shield wall in each unit. See Figures 2 and 3 for basket location details for Unit 3 and Unit 4, respectively.

The current design specifies eight small baskets that are 3' x 3' x 2.5' in size and rest 6.75" above the containment floor on four stainless steel leveling casters that can be locked in position. Each of these small baskets weighs 686 lbm when empty and as much as 1,926 lbm when filled with NaTB. The design also specifies two large baskets that are 4.5' x 4.5' x 2.77' in size and rest 3.5" above the containment floor on four stainless steel levelers. Each of these large baskets weighs 1,450 lbm empty and as much as 4,540 lbm when filled with NaTB.

The baskets are designed to be freestanding. Both the small and large baskets are equipped with levelers on each corner while only the small baskets also have locking casters to aid in their positioning. The baskets have been analyzed to assure that they will not slide or overturn under the governing design and seismic loads whether the baskets are empty or full.

For sliding analysis, the basket friction force (R_f) must be greater than the basket sliding force (P_h) resulting from the safe shutdown earthquake (SSE) horizontal acceleration in order to prevent the sliding of the basket during a seismic event. See table below for calculated forces and margins.

	Friction Force R_f	Sliding Force P_h	Margin
Small Basket (Full)	475.26 lb	408.43 lb	14%
Small Basket (Empty)	158.46 lb	136.18 lb	14%
Large Basket (Full)	1122.82 lb	964.92 lb	14%
Large Basket (Empty)	332.80 lb	286.00 lb	14%

For overturning analysis, the basket resisting moment (M_{Ro}) must be greater than the basket overturning moment (M_o) where the baskets are assumed to be unrestrained and free to rotate about their support legs (casters/levelers). See table below for calculated forces and margins.

	Resisting Moment M_{Ro}	Overturning Moment M_o	Margin
Small Basket (Full)	24.56 in-kip	10.83 in-kip	56%
Small Basket (Empty)	*	*	*
Large Basket (Full)	96.38 in-kip	31.54 in-kip	67%
Large Basket (Empty)	*	*	*

* Overturning analysis for empty baskets bounded by full basket results

Stresses in critical structural members and connections have been evaluated for the load combinations described in FPL's earlier RAI response [Reference 4] and analyses have been performed to justify the design adequacy of structural members and deflections at critical joints. The results of the analyses demonstrate the design adequacy of the structural members of the baskets. The maximum joint deflections and member stresses were determined to be within allowable values with adequate design margin for both the small and large baskets. The bolted and welded basket connections were evaluated and found acceptable. The basket mesh strength was evaluated and found acceptable. The capacities of the casters and levelers for the small baskets and the levelers for the large baskets were also evaluated and found acceptable. Lastly, the added floor loading was evaluated and found acceptable.

	Maximum Deflection	Allowable Deflection	Margin
Critical Joint – Small Basket			
Limiting Joint (Δx)	0.006 in	0.0625 in	90.4%
Limiting Joint (Δy)	0.006 in	0.0625 in	90.4%
Limiting Joint (Δz)	0.00006 in	0.0625 in	99.9%
Critical Joint – Large Basket			
Limiting Joint (Δx)	0.016 in	0.0625 in	74.4%
Limiting Joint (Δy)	0.014 in	0.0625 in	77.6%
Limiting Joint (Δz)	0.0021 in	0.0625 in	96.6%

	Maximum Stress Ratio	Allowable Stress Ratio	Margin
SB Limiting Member	0.20	1	80%
SB Support Pipe Stub	0.04	1	96%
LB Limiting Member	0.51	1	49%
Bolted Connection	0.40	1	60%
Welded Connection	0.04	1	96%
Mesh – Small Basket	0.47	1	53%
Mesh – Large Basket	0.74	1	26%
Castor – Small Basket	0.52	1	48%
Leveler – SB & LB	0.72	1	28%
Leveler Bearing Stress	0.23	1	77%
Containment Floor	0.61	1	39%

3. ***FPL stated on p. 30 of 40 of Enclosure 1 that it will replace the aluminum fins on the normal containment coolers with copper fins to generate less chemical debris.***

   a. ***Provide a description and results of the evaluation of potential structural effects on the coolers as a result of the fin replacement.***

   Operation of Turkey Point Units 3 and 4 at Extended Power Uprate (EPU) conditions (with associated increased pressure and temperatures) will require additional containment cooling capacity to remove the associated increase in heat load from the containment building atmosphere. To satisfy these heat removal requirements, the existing four (4) normal containment cooler (NCC) units will be replaced in their entirety with four (4) new larger capacity cooling units. In addition, the cooler fins will be of copper instead of aluminum to reduce potential chemical precipitate formation under post-accident conditions. As such, this modification is not specifically required for AST implementation.

   The new units are designed and constructed as unfired pressure vessels, in accordance with the requirements of ASME Section VIII. The vessels will be "U" stamped and fully qualified for the specified operating conditions as well as seismic and accident conditions. Their evaluation is documented in the manufacturer's design report and was performed to the 2007 ASME Code with 2008a Addenda reconciled to the 1986 ASME Code.

   Each cooling unit will be supplied as an assembly, consisting of the coil with fins, casing components, fan with housing, electrical motor, control features and supporting skid. The coils (tubes) of the NCCs are classified as Seismic Class I safety related components, and passively maintain the component cooling water piping system pressure boundary. The new copper radiator fins are non-pressure boundary components of the NCCs. In the evaluation performed, the fins are considered (conservatively) as additional weight (mass) only bearing on the tubes of the coil and no credit is taken for the structural capacity of the fins.

   Seismic analysis for the NCC coil has been conducted utilizing static coefficient analysis techniques. The static acceleration coefficient has been based on the applicable peak spectra acceleration multiplied by a static coefficient of 1.5 to account for multi-frequency excitation and multi-mode response effects utilizing the methodology of IEEE Standard 344 as a guideline [Reference 6]. Using applicable load combinations for safety related components, the resulting stresses for coil components have been compared to appropriate stress limits of the ASME code, and the AISC Manual of Steel Construction, as applicable, and have been found acceptable.

The support skid has been designed as a Seismic Class I component, capable of carrying the design loads from the new safety related coil, fins, casing, and quality-related fan/motor assembly. Elastic analysis for the skid takes into account seismic loads (OBE/SSE) from the entire NCC unit (coils with fins, casing components, fan, motor, etc.). The seismic loads have been determined using the static coefficient analyses method discussed above. Normal plus worse case seismic stresses have been conservatively compared to normal allowable stresses determined in accordance with the AISC Manual of Steel Construction. The results of the analyses indicate that the skid assembly is adequate to carry the design loads imposed by the NCC units.

The new NCC units are heavier than the existing NCC units which in turn result in larger design loads (including seismic) being applied to existing support structure. The increased design loads for supporting the new NCC units are being considered in the review of existing structure's capability to carry the heavier equipment. The design modifications will include changes to the existing structures required to support the configuration of the new NCC skids. The support structures will be designed to accommodate the larger design loads. Allowable stresses are defined in UFSAR Chapter 5 for seismic Class I structures. These load combinations have been provided in the previous RAI response [Reference 4].

References

1. W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2009-133), "License Amendment Request 196: Alternative Source Term and Conforming Amendment," Accession No. ML092050277, June 25, 2009.
2. J. Paige (NRC) to M. Nazar, "Turkey Point Units 3 and 4 – Request for Additional Information Regarding Alternative Source Term (TAC Nos. ME1624 and ME1625)," Accession No. ML093500665, December 17, 2009
3. B. Mozafari (NRC) to M. Nazar, "Turkey Point Units 3 and 4 – Supplemental Information Needed for Acceptance of Requested Licensing Action RE: Alternate Source Term Amendment Request (LAR-196) (TAC Nos. ME1624 and ME1625)," Accession No. ML092220696, August 18, 2009
4. W. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2009-195), "Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Alternate Source Term Amendment Request (TAC Nos. ME1624 and ME 1625)," Accession No. ML092520357, August 26, 2009.
5. B. Jefferson (FPL) to U.S. Nuclear Regulatory Commission (L-2008-243), "Updated Final Safety Analysis Report—Unit 4 Cycle 23 Update," November 11, 2008.
6. IEEE Standard 344-1975, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations

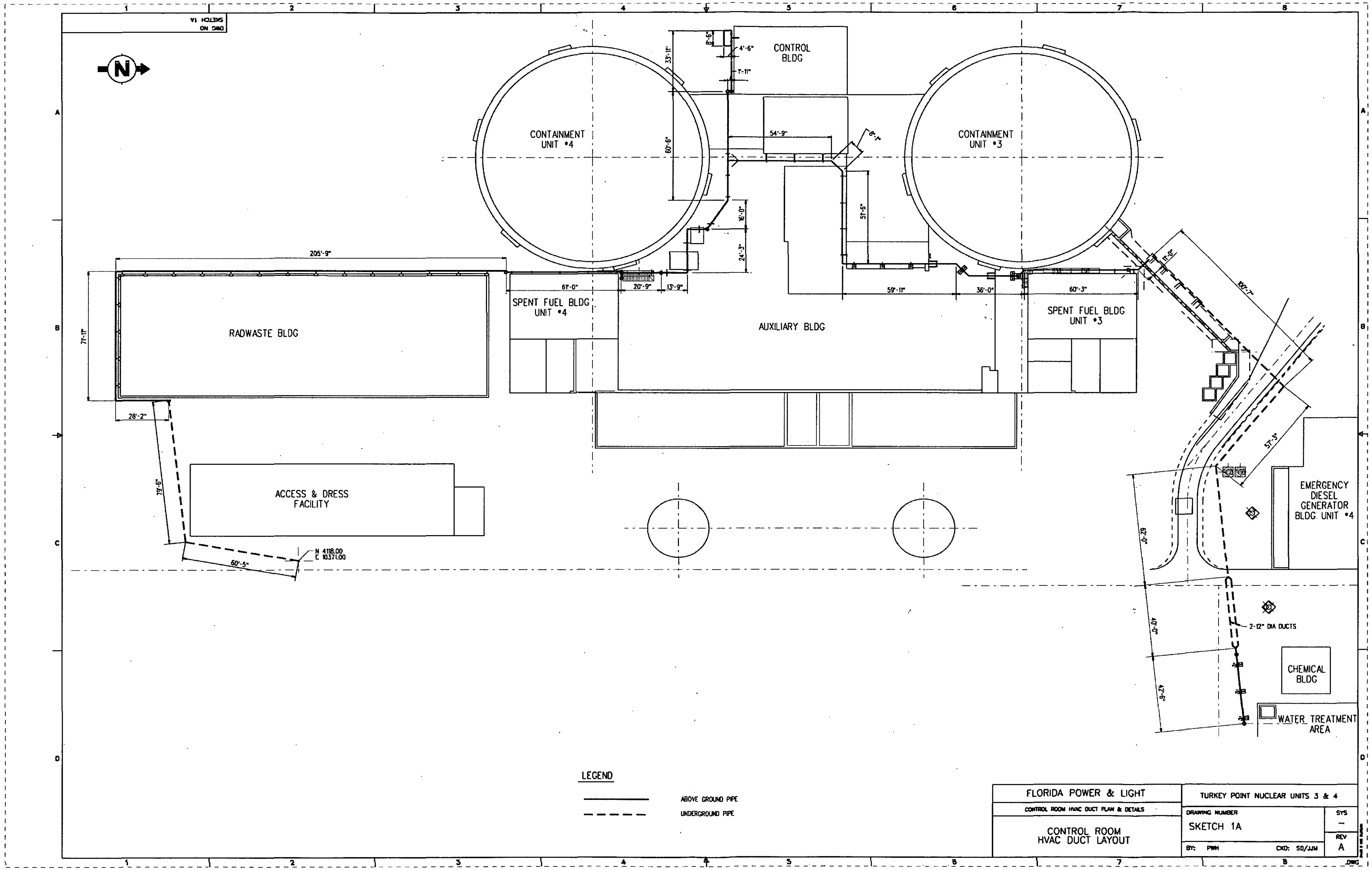

Figure 1 – Planned Routing of CREVS Air Intakes

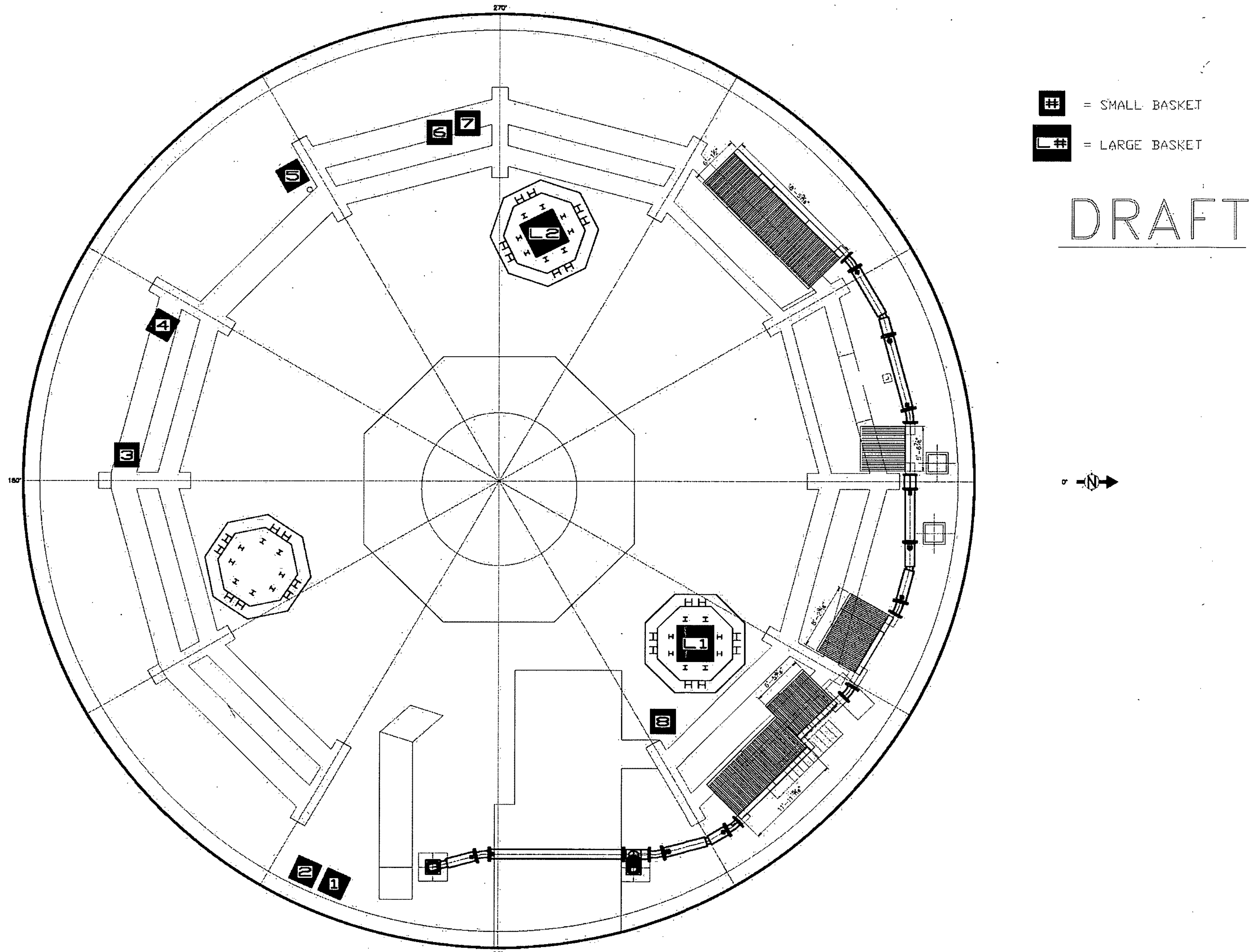

Figure 2 – Planned Unit 3 Basket Locations

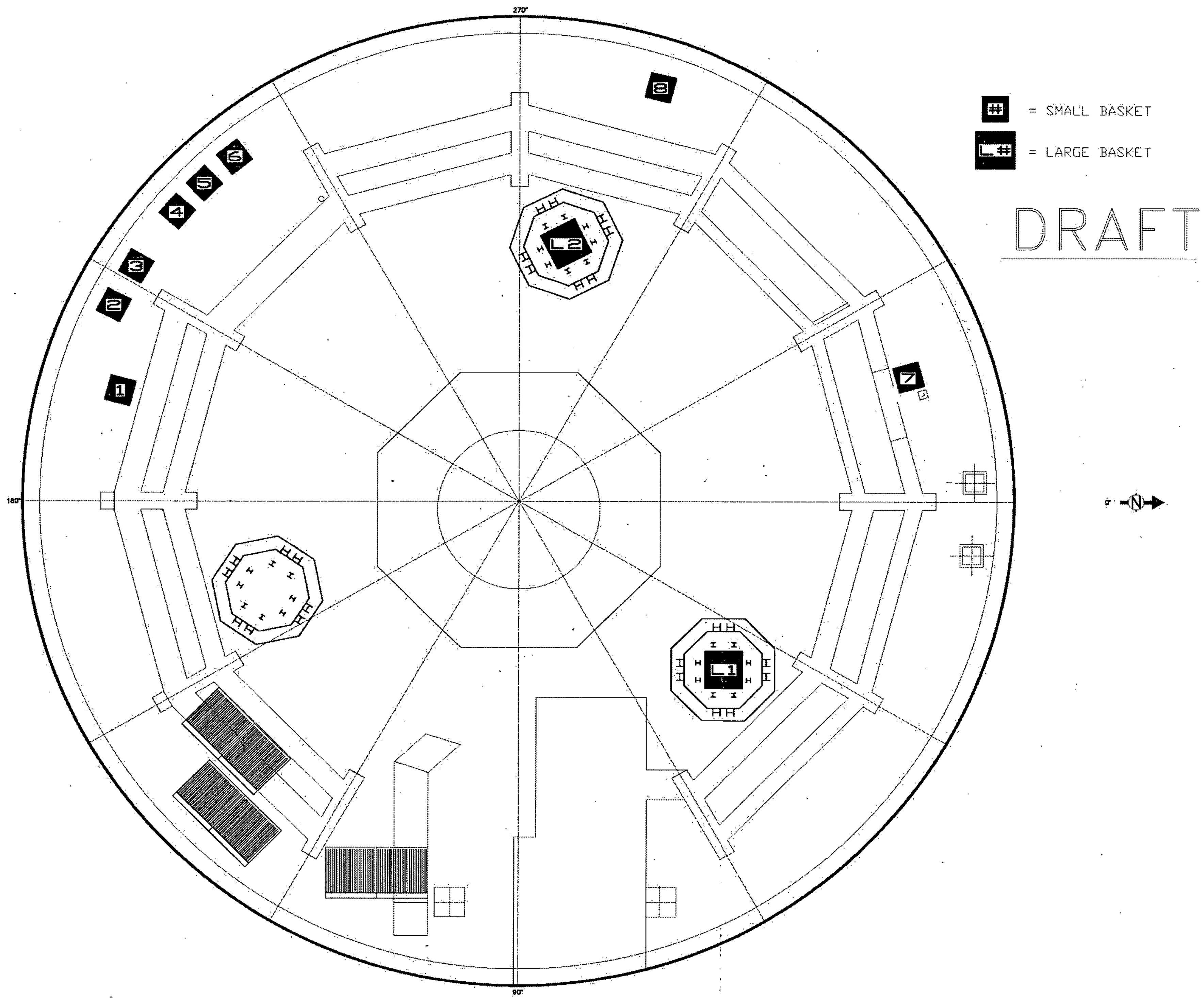

Figure 3 – Planned Unit 4 Basket Locations