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December 15, 1999

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555-0001

Subject: Supplemental Information Regarding ASME Code Relief Request No. 45

Reference: Con Edison Letter to USNRC dated October 6, 1999

Pursuant to 10 CFR 50.55a(a)(3), Consolidated Edison Company of New York, Inc. (Con Edison) previously submitted via the referenced letter, a request for approval of alternatives to the ASME Boiler & Pressure Vessel Code Section XI requirements for performing containment examinations.

On December 2, 1999, a conference call between members of your staff and Con Edison was held to discuss Relief Request No. 45, and an enclosure document entitled, "Visual Inspection Acceptance Criteria for ISI of IP-2 Concrete Containment Structure." This relief request proposes an alternative to the ASME Boiler & Pressure Vessel Code, Section XI, Subsection IWE/IWL, 1992 Edition, with 1992 Addenda, requirements for minimum illumination and maximum distances to be adhered to while performing visual examinations of containment. Based upon the comments received during the call, Relief Request No. 45 has been revised, and is hereby enclosed as Attachment I to this letter. This revision of Relief Request No. 45 supercedes the request previously submitted by Reference 1. Also enclosed as Attachment II, are additional pages consisting of Tables and Figures, which were inadvertently omitted from the visual inspection acceptance criteria document submitted by Reference 1. These pages summarize the calculated containment stress values, acceptable crack sizes, acceptance criteria flow charts, and containment figures.

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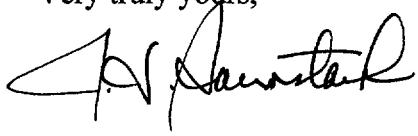
No new regulatory commitments are being made by Con Edison in this correspondence.

Should you or your staff have any questions regarding this matter, please contact Mr. John McCann, Manager, Nuclear Safety & Licensing.

Very truly yours,



Attachments

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ATTACHMENT I

Revised Relief Request 45

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
December 1999

**RELIEF REQUEST NUMBER 45**
(Page 1 of 2)

## COMPONENT IDENTIFICATION

| | |
|---|---|
| Code Class: | CC |
| References: | IWL-2310, IWA-2210 |
| Examination Category: | L-A, Concrete |
| Item Number: | L1.11 |
| Description: | VT Illumination & Distance |

## CODE REQUIREMENT

Subarticle IWL-2310, Visual Examination, Personnel Qualifications and Responsible Engineer, includes requirements for minimum illumination and maximum direct examination distance (of Class CC components) under paragraph IWA-2210.

Currently for IP-2, ASME Section XI, 1989 Edition with no Addenda, is mandated for the third ten-year interval of the Inservice Inspection Program for Quality Group A, B & C. The 1989 Code visual examination criteria for illumination and distance are applicable only to VT-1. This is a requirement of the current ISI Program, for Quality Group A, B & C, until the end of the third interval on May 18, 2005.

## BASIS FOR RELIEF

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii). Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Approximately 15% of the concrete containment surface is accessible for direct visual examination. Accessibility to higher portions of the dome and the containment building itself make it a hardship to obtain the maximum direct examination distance and minimum illumination requirements. The installation of extensive temporary scaffold systems or a climbing scaffold system to access these portions of the containment would be necessary.

An amendment to 10 CFR 50.55a, for remote examination of the containment liner, permits alternatives to the requirements specified in Table IWA-2210-1. The maximum direct examination distance requirements may be extended, and the minimum illumination requirements may be decreased provided that the conditions or indications, for which the visual examination is performed, can be detected at the chosen distance and illumination. Furthermore, IWA-2210 permits remote examination techniques to be substituted for direct examination, and IWA-2240 provides for alternative examinations, provided the Authorized Nuclear Insurance Inspector (ANII) is satisfied that the results are demonstrated to be equivalent or superior to those of the specified method.

**RELIEF REQUEST NUMBER 45**
(Page 2 of 2)

## PROPOSED ALTERNATIVE PROVISIONS

An IP-2 site-specific visual acceptance criteria document, "Visual Inspection Acceptance Criteria for In-Service Inspection (ISI) of IP2 Concrete Containment Structure," has been developed (see attached). The IP-2 containment is a reinforced concrete structure with a metal liner. An evaluation of the structure has identified threshold values that the structure is able to tolerate without compromising its structural integrity. The primary degradation mechanism is corrosion, with corrosion products being the indicator of degradation and not cracks. This evaluation divided the containment into three areas based on stresses to the reinforcement bars. In two areas, the dome and shell, the reinforcement bars were designed with sufficient margin to allow for corrosion. The third area, the hatch and penetration area, is where the design stresses are maximized. All three areas will be inspected, relative to their threshold values, to determine the continued structural integrity of both the reinforcing steel and structural concrete. For the three containment areas identified, the specific examination procedures and acceptance criteria to be followed will be based upon the threshold values as determined in the above-mentioned evaluation.

The Registered Professional Engineer (RPE) will identify the minimum size of the indications of interest. For remote visual examinations, the procedure and equipment to be used will be demonstrated capable of resolving these minimum indications to the satisfaction of the RPE and the Authorized Nuclear Insurance Inspector (ANII). In addition, indications of corrosion products will be evaluated to determine the source and the effect on containment structural integrity.

## PERIOD FOR WHICH RELIEF IS REQUESTED

Relief is requested for the Inspection Interval ending September 9, 2001 as indicated in the Federal Register 41303 (August 8, 1996).

## JUSTIFICATION FOR RELIEF

IP-2 containment has been tested per Appendix J as required by the plant Technical Specifications. The Integrated Leak Rate Test (ILRT) has not identified any unacceptable conditions associated with the containment. Completion of the required visual inspections and evaluation of the results for compliance with the site specific acceptance criteria will adequately verify the continued acceptability of the concrete containment.

The Code committee has acknowledged the difficulties in performing the containment examinations, as required by the 1992 Edition of Section XI. The requirement to comply with IWA-2210 has been removed from Subsection IWL in the 1998 Edition of Section XI of the Code.

ATTACHMENT II

Tables and Figures

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
December 1999

# TABLES

## TABLE 1

**Summary of Maximum Calculated Tensile Stresses in the Reinforcing Steel in the Outer Face of Containment Cylinder and Dome Away From Large Penetrations**

| Elevation ( Ft.) | 1.0D +1.0 To [1] | | 1.0D + 1.5 P + 1.0 Ta [2] | |
|---|---|---|---|---|
| | Vertical Bar (ksi) | Horizontal Bar (ksi) | Vertical Bar (ksi) | Horizontal Bar (ksi) |
| 225.8(dome) | 1.36 | 2.76 | 27.60 | 34.60 |
| 191.0(dome) | 0.75 | 3.83 | 28.40 | 33.90 |
| 191.0(wall) | 0.46 | 3.10 | 28.10 | 38.70 |
| 117.0 | C [3] | 1.77 | 24.10 | 35.40 |
| 64.0 | C [3] | 2.20 | 26.10 | 28.10 |
| 45.7 | C [3] | Negligible | 34.10 | Negligible |

Notes:

1. This load combination did not govern the design and detailed calculations were not performed. Values tabulated are based on calculations (see Attachment B) using the methodology and data included in the original calculations (Book No. 16, Reference 8.14) and Tables 3.2 and 3.3 of the Containment Design Report (Reference 8.13). The design operating temperature inside the containment was 120° F. The actual operating temperature is 130° F. The data provided in this Table is based on 120° F. The effect of slightly higher temperature on the stress values shown is negligible.

2. Values extracted from Table 3.3 of the Containment Design Report and are based on an accident temperature of 247° F. The revised postulated accident temperature is 260° F. The effect of slightly higher temperature on the stresses shown is negligible.

3. Rebar in compression.

## TABLE 2

**Summary of Maximum Calculated Tensile Stresses in the Reinforcing Steel in the Outer Face of the Equipment Hatch Area**

| Location | 1.0D +1.0 To [1] | | 1.0D + 1.5 P + 1.0 Ta [2, 3,4,5] | |
|---|---|---|---|---|
| | Vertical Bar (ksi) | Horizontal Bar (ksi) | Vertical Bar (ksi) | Horizontal Bar (ksi) |
| Cylinder Upper Half | 14.90 | 12.76 | 54.30 | 66.02 |
| Cylinder Lower Half | 11.60 | 15.06 | 62.80 | 61.96 |
| Boss | 13.56 | 15.82 | 62.02 | 69.99 |

Notes:

1. This load combination did not govern the design and detailed calculations were not performed. Values tabulated are extracted from Table 3.4.4-1 of the Containment Design Report (CDR) as described below:

2. Dead Load stresses on pages 4, 5, and 6 of the CDR - compressive stresses are neglected.

3. Thermal load I (for 247° F accident temperature) on pages 13, 14 and 15 of CDR - one half of the stress values given are used for the operating temperature of 120° F.

4. Values extracted from Table 3.4.4-1 of the Containment Design Report (pages 43, 44 45).

5. Local yielding of the outer rebar occurs, however, it was shown that the section provided is adequate to resist the load combination (Reference page 3.0-50 of the Containment Design Report).

## TABLE 3

**Summary of Design Margin for Tensile Stresses in the Reinforcing Steel in the Outer Face of Containment Cylinder and Dome Away From Large Penetrations**

| Elevation ( Ft.) | 1.0D +1.0To [2] | | 1.0D + 1.5P + 1.0Ta [3] | |
|---|---|---|---|---|
| | Vertical Bar (ksi) | Horizontal Bar (ksi) | Vertical Bar (ksi) | Horizontal Bar (ksi) |
| 225.8(dome) | 96% | 91% | 52% | 39% |
| 191.0(dome) | 97% | 84% | 50% | 41% |
| 191.0(wall) | 99% | 90% | 51% | 32% |
| 117.0 | N/A | 94% | 58% | 38% |
| 64.0 | N/A | 93% | 52% | 51% |
| 45.7 | N/A | 100% | 37% | 100% |

Notes:

1. Design margin (%) = (1 - Actual Stress / Allowable Stress) x 100.

2. The allowable is 24 ksi, based on ACI 318-63, Part IV-A for working stress design, multiplied by 1.3, which is permitted by the Standard Review Plan for load combinations with To. Thus,

   24 x 1.3 = 31.2 ksi

3. The allowable is $\phi$ Fy, where $\phi$ = 0.95 for tension and 0.9 for flexure. Thus,

   60 x 0.95 = 57 ksi
   60 x 0.9 = 54 ksi

4. N/A denotes not applicable.

## TABLE-4

### Summary of Design Margin for Tensile Stresses in the Reinforcing Steel in the Outer Face of the Equipment Hatch Area

| Location | 1.0D +1.0To | | 1.0D + 1.5P + 1.0Ta | |
|---|---|---|---|---|
| | Vertical Bar (ksi) | Horizontal Bar (ksi) | Vertical Bar (ksi) | Horizontal Bar (ksi) |
| Cylinder Upper Half | 52% | 59% | Note 2 | Note 2 |
| Cylinder Lower Half | 63% | 52% | Note 2 | Note 2 |
| Boss | 57% | 49% | Note 2 | Note 2 |

Notes:

1. For definition of design margin and allowable stresses, see Table 3.

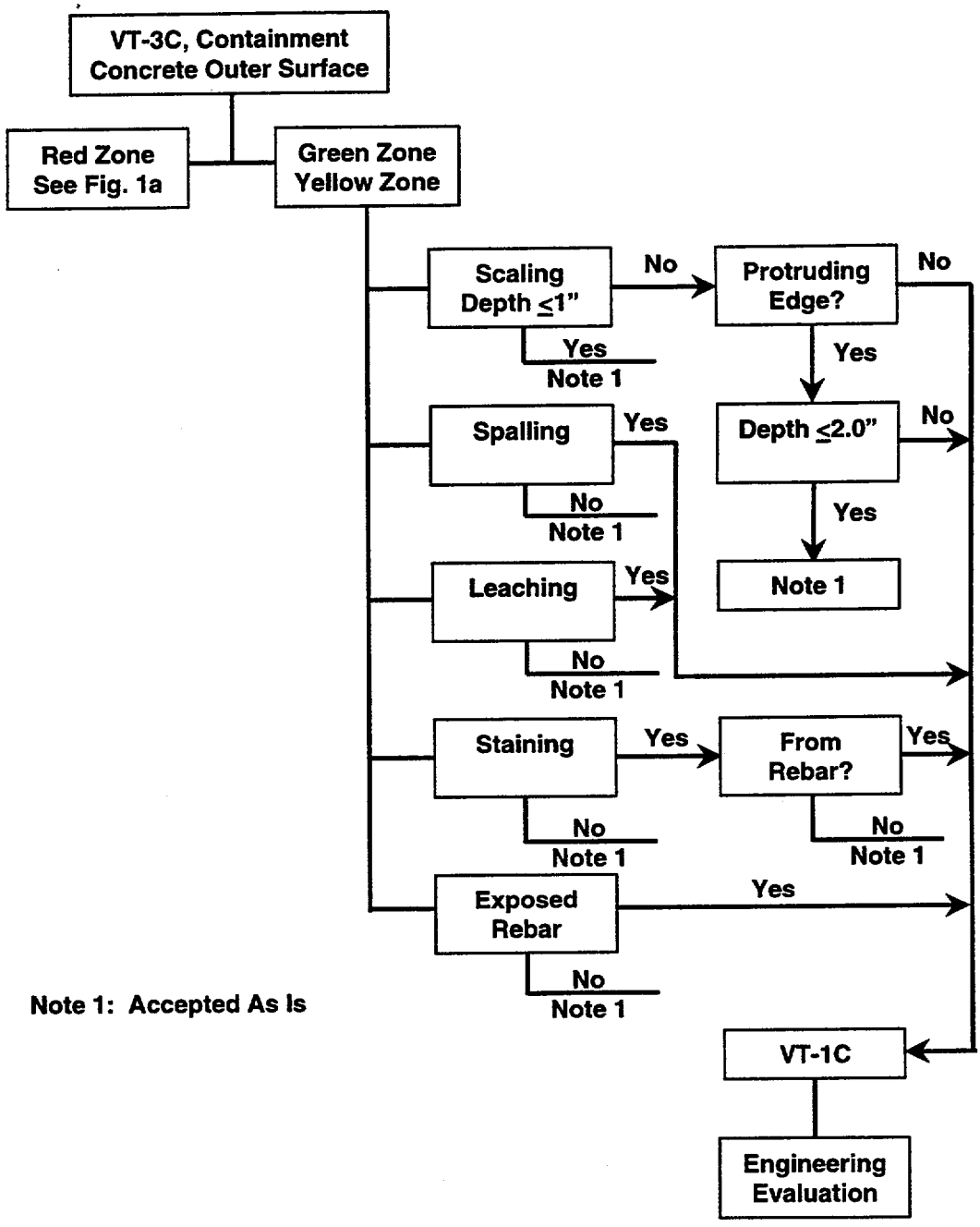
2. As shown in Table 2 that local yielding occurs in this area under this load combination. Case by case evaluation will be required for any identified conditions resulting from the In-Service Inspection.

## TABLE-5
## Summary of Acceptable Crack Sizes Based on Industry Data and The IP2 Containment Historical and Design Basis Data

| Source | Crack Size (Inches) | Crack Size (mm) | Comment |
|---|---|---|---|
| ACI 318, ACI 349 | 0.016 | 0.41 | Design Requirement, Interior Exposure |
| ACI 318, ACI 349 | 0.013 | 0.33 | Design Requirement, Exterior Exposure |
| ACI 207.3R | <0.040 | <1.00 | In-Service Fine Crack |
| ACI 207.3R | 0.040 to 0.080 | 1.00 to 2.00 | In-Service Medium Crack |
| ACI 207.3R | > 0.080 | > 2.00 | In-Service Wide Crack |
| EPRI NP-6695 | 0.060 | 1.50 | Maximum Acceptable After a DBE |
| IP2 Containment | 0.005 | 0.13 | Shrinkage, General Areas Before SIT |
| IP2 Containment | 0.010 | 0.25 | Max. Shrinkage, Before SIT |
| IP2 Containment | 0.020 | 0.50 | During SIT, General Areas |
| IP2 Containment | 0.030 | 0.75 | Maximum During SIT |
| IP2 Containment | 0.010 | 0.25 | Maximum After SIT |
| Calculated Shrinkage Crack | 0.012 | 0.30 | Spacing 15" |
| Calculated Shrinkage Crack | 0.048 | 1.20 | Spacing 60" |
| Calculated Temperature Crack | 0.012 | 0.30 | Spacing 15" |
| Calculated Temperature Crack | 0.048 | 1.20 | Spacing 60" |
| Temp + Shrinkage | 0.024 | 0.60 | Spacing 15" |
| Temp + Shrinkage | 0.100 | 2.50 | Spacing 60" |
| Stress Related | 0.030 | 0.75 | Outer rebar yielding |

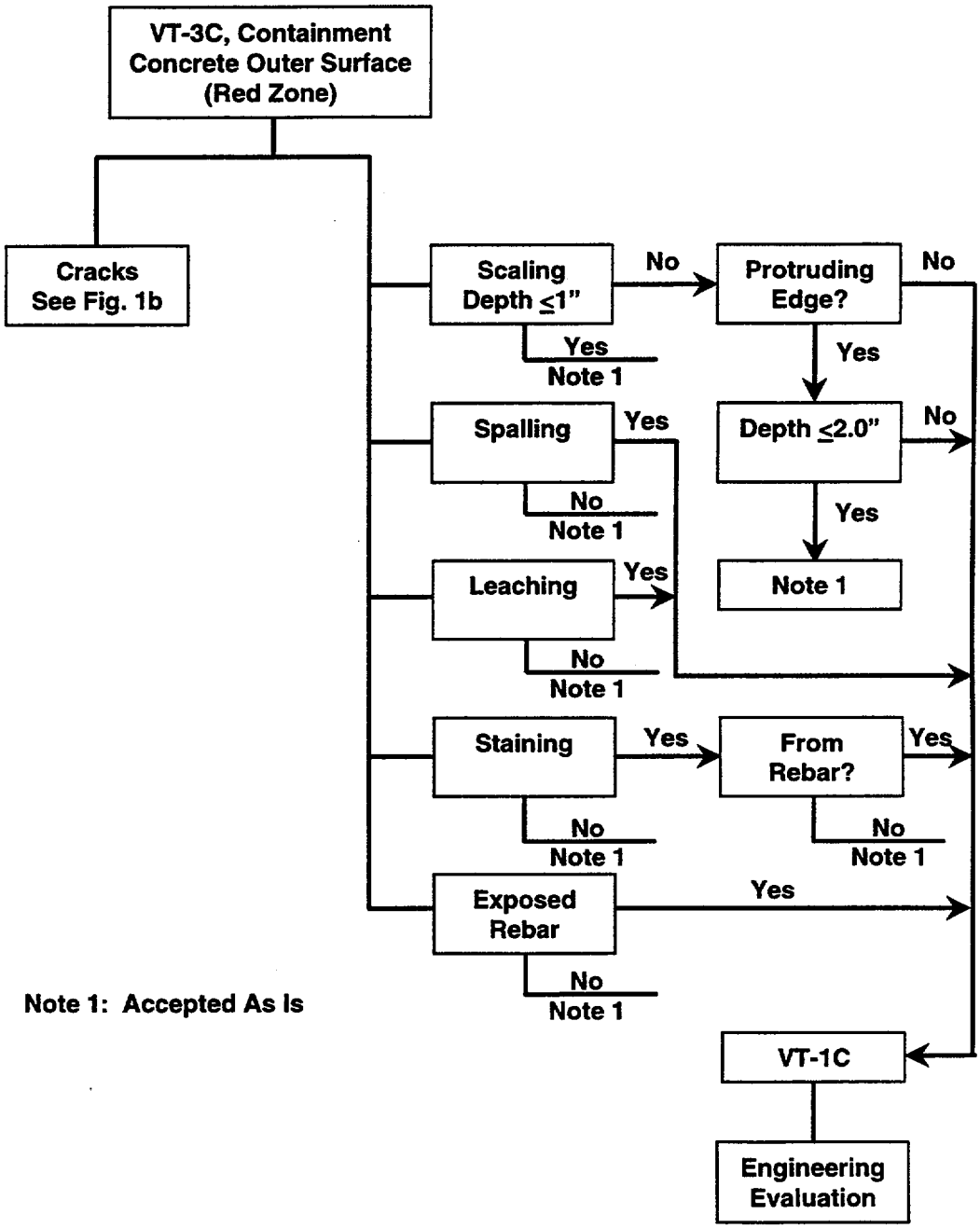
# FIGURES

# Figure 1
# Flow Chart for Containment Inspection Acceptance Criteria




Note 1: Accepted As Is

# Figure 1a
# Flow Chart for Containment Inspection Acceptance Criteria - Red Zone -



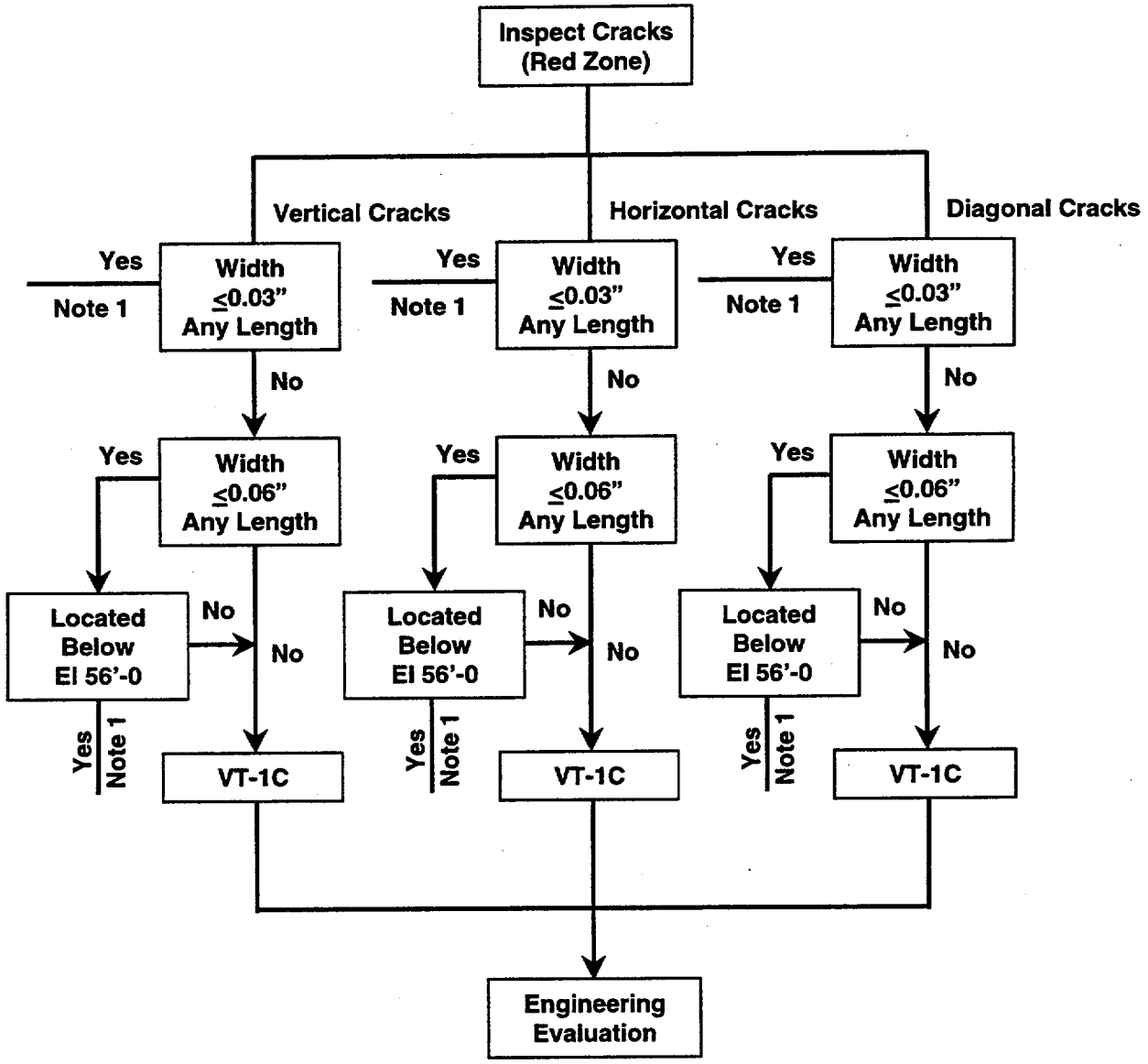

Note 1: Accepted As Is

Flows.ppt
91450044 8_99

Con Edison Company
Indian Point Unit No. 2
Inspection Criteria

Figure 1b

# Flow Chart for Containment Inspection Acceptance Criteria - Red Zone Cracks -

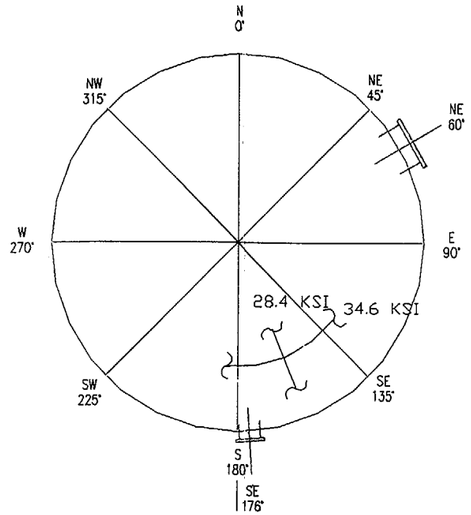



Note 1: Accepted As Is

Flows.ppt
91450044 8_99

Con Edison Company
Indian Point Unit No. 2
Inspection Criteria

N



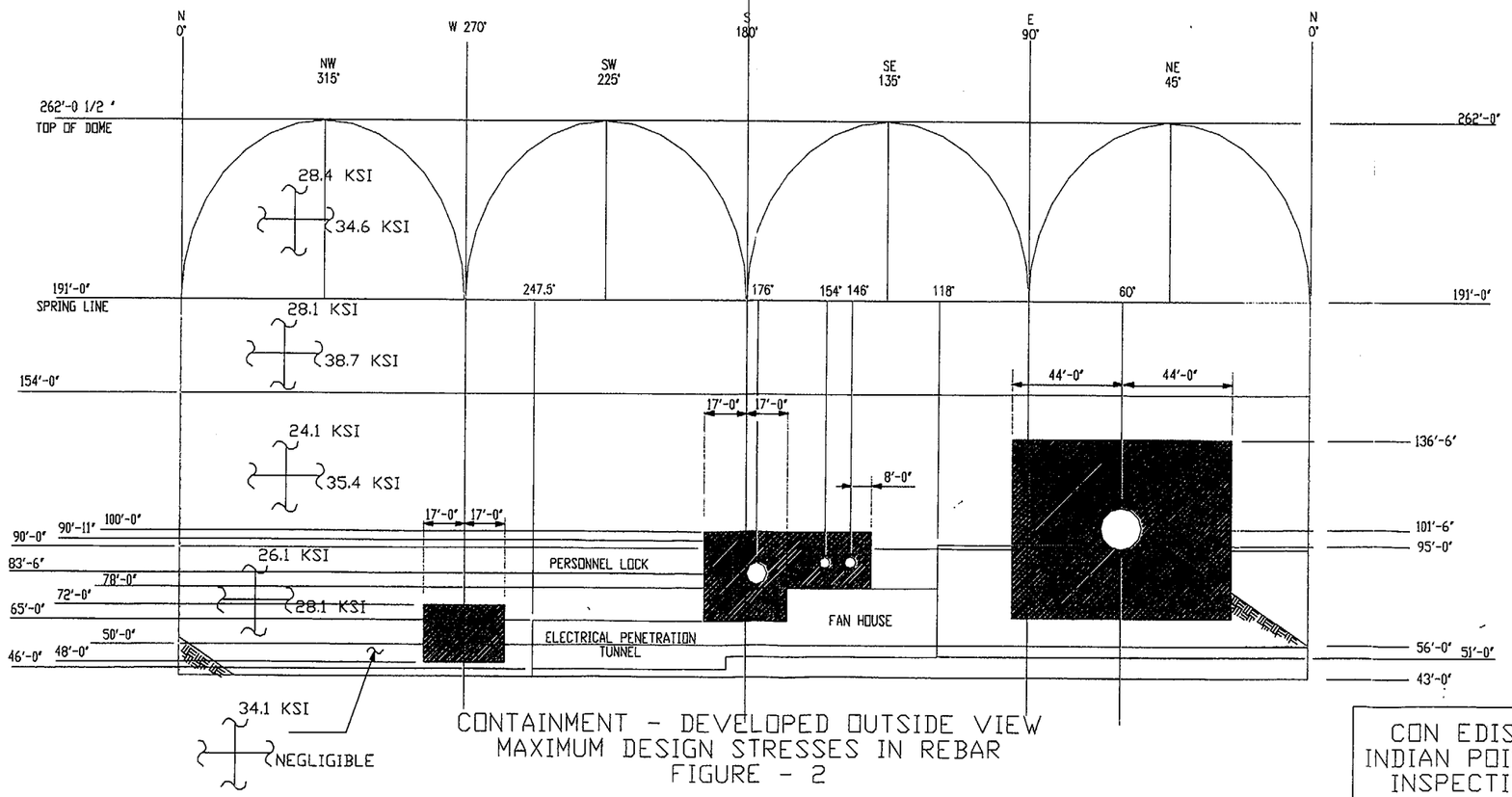

CONTAINMENT PLAN

LEGEND:

62.8 KSI

69.99 KSI

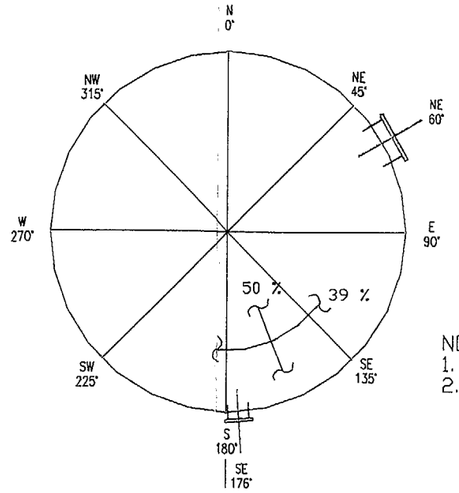
NOTE:
1. ALL PRIMARY REBAR ARE #18S.
2. SEE TABLES 1 AND 2 FOR MORE DETIALS.




CONTAINMENT - DEVELOPED OUTSIDE VIEW
MAXIMUM DESIGN STRESSES IN REBAR
FIGURE - 2

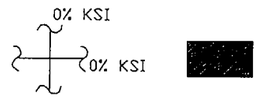
CON EDISON COMPANY
INDIAN POINT UNIT No. 2
INSPECTION CRITERIA

N

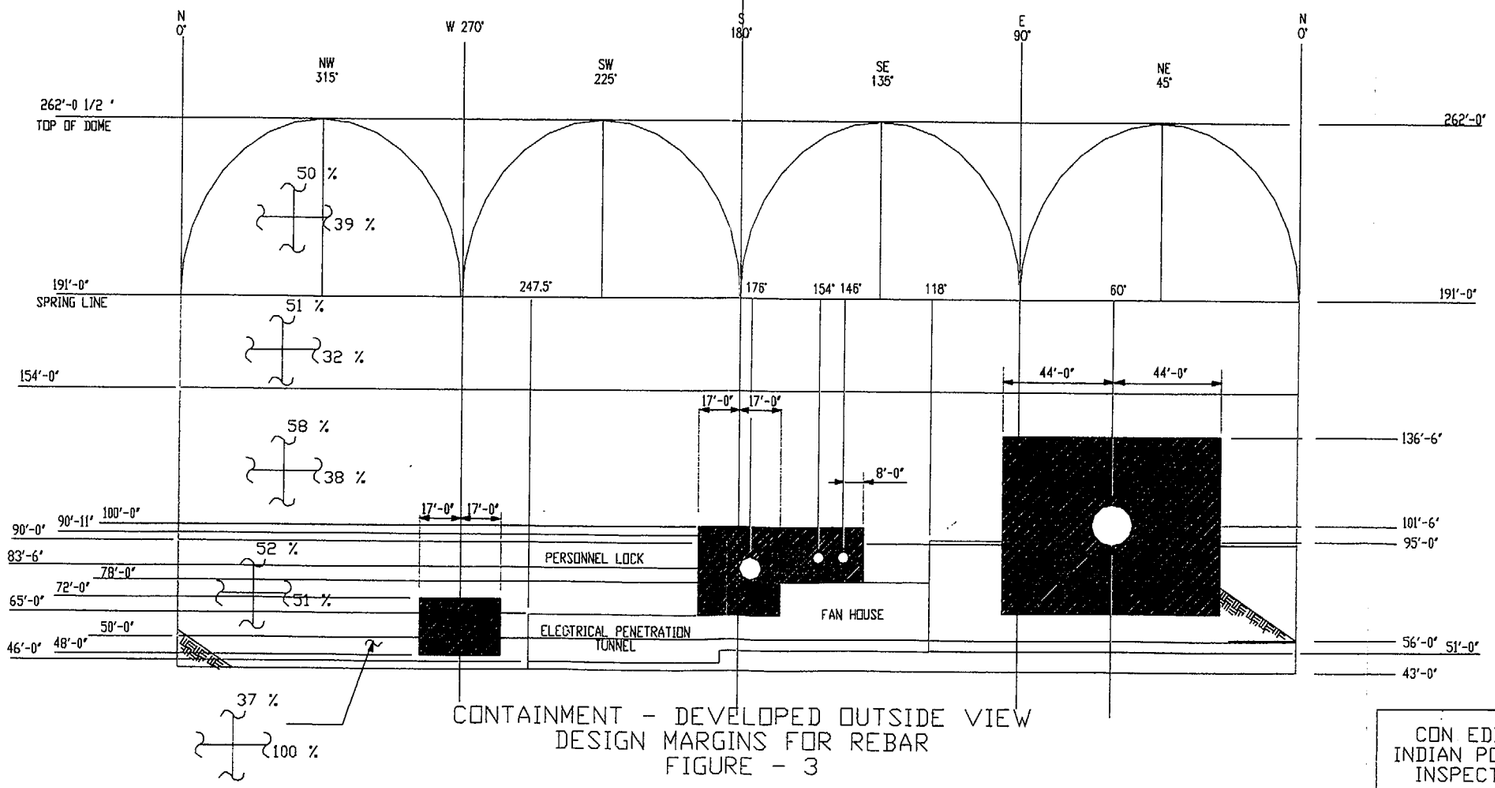



CONTAINMENT PLAN

LEGEND:



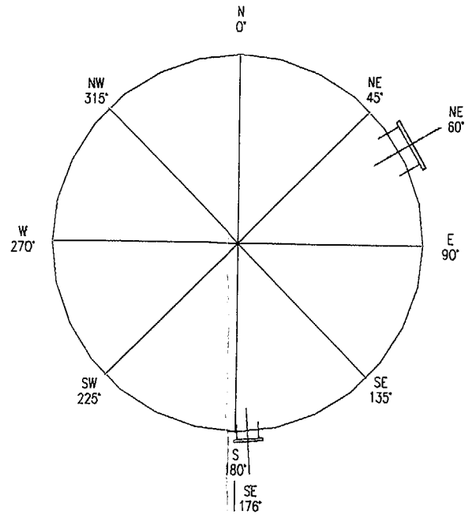

NOTE:
1. ALL PRIMARY REBAR ARE #18S.
2. SEE TABLES 3 AND 4 FOR DEFINITION OF DESIGN MARGINS.




CONTAINMENT - DEVELOPED OUTSIDE VIEW
DESIGN MARGINS FOR REBAR
FIGURE - 3

CON EDISON COMPANY
INDIAN POINT UNIT No. 2
INSPECTION CRITERIA

N



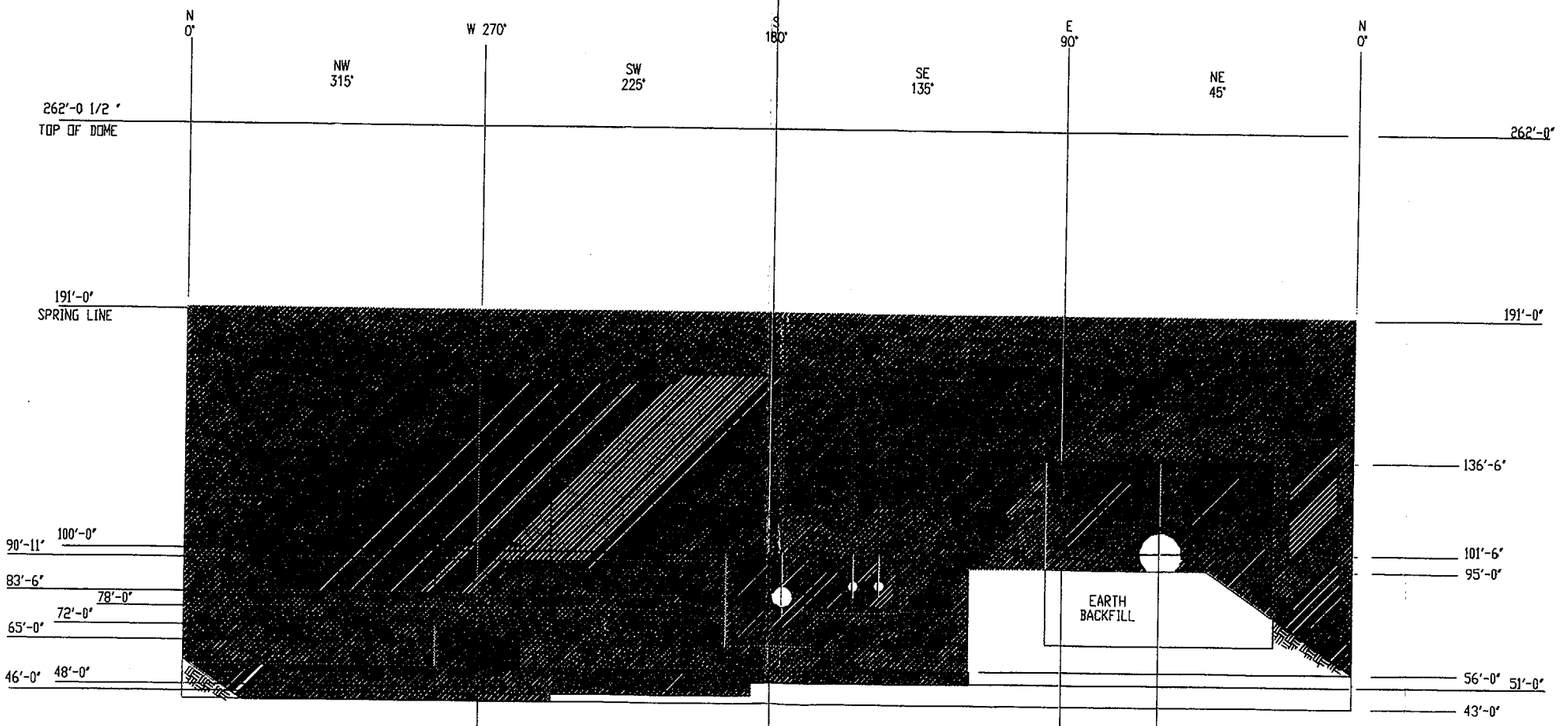

CONTAINMENT PLAN

LEGEND:

CLOSE-UP INSPECTION OF CONCRETE CRACKS IS NOT NEEDED

CLOSE-UP INSPECTION OF CONCRETE CRACKS IS NOT NEEDED

MAX. CONCRETE CRACK WIDTH AT HATCH = 0.03"
MAX. CONCRETE CRACK WIDTH AT MAT INTERSECTION = 0.06"




CONTAINMENT - DEVELOPED OUTSIDE VIEW
ACCEPTANCE CRITERIA FOR CONCRETE CRACKS
FIGURE - 4

CON EDISON COMPANY
INDIAN POINT UNIT No. 2
INSPECTION CRITERIA