NMC
Committed to Nuclear Excellence

Point Beach Nuclear Plant
Operated by Nuclear Management Company, LLC

August 26, 2004

NRC 2004-0086
10 CFR 54

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

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
License Nos. DPR-24 and DPR-27

Response to Request for Additional Information
Regarding Sections 3.5 and 4.5 of the Point Beach Nuclear Plant
License Renewal Application
(TAC Nos. MC2099 and MC 2100)

By letter dated February 25, 2004 (NRC 2004-0016), Nuclear Management Company, LLC (NMC), submitted the Point Beach Nuclear Plant (PBNP) Units 1 and 2 License Renewal Application (LRA). On July 27, 2004, the Nuclear Regulatory Commission (NRC) requested additional information regarding Sections 3.5 and 4.5 of the LRA for PBNP. Enclosed is our response to that request.

Should you have any questions concerning this submittal, please contact Mr. James E. Knorr at (920) 755-6863.

Summary of Commitments

New commitments made as part of this response are as follows:

1. Two penetrations in the Unit 2 Containment will be opened and inspected during the spring 2005 refueling outage.

2. The Structures Monitoring Program will be enhanced to conduct and document a structural condition survey of the reactor vessel sump area.

3. Final tendon stress and trend calculation results will be provided if the results are different than those provided in this response.

A093

4. The Structures Monitoring Program will be updated as part of the LRA annual update to include wood as a material to be inspected.

I declare under penalty of perjury that the forgoing is true and correct. Executed on August 26, 2004.

Dennis L. Koehl
Site Vice-President, Point Beach Nuclear Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
POINT BEACH NUCLEAR PLANT, UNITS 1 & 2
LICENSE RENEWAL APPLICATION

Telephone conferences were held June 24 and July 13, 2004, between NRC and NMC representatives, at which time all of the draft requests for additional information (D-RAIs) were discussed. The NRC provided points of clarification to the D-RAIs. Responses provided here address the points of clarification in addition to the Requests for Additional Information (RAI). The NRC staff's questions are restated below, with the NMC response following.

NRC Question RAI 3.5-1

In discussing Item Number 3.5.1-3 (Table 3.5.1) of the LRA, the applicant asserts that the Point Beach Nuclear Plant (PBNP) aging management review (AMR) results are consistent with NUREG-1801. NUREG-1801 under Item A3.1 (Page II A3.6) recommends further evaluation regarding the stress corrosion cracking of containment bellows. The applicant is requested to provide additional information regarding the containment pressure boundary bellows at PBNP, relevant operating experience, and method(s) used to detect their age related degradation. Note: In many cases, VT-3 examination of IWE, and Type B, Appendix J testing cannot detect such aging effects (See NRC Information Notice 92-20).

NMC Response:

PBNP does not have any containment penetration bellows that function as a pressure boundary within the scope of License Renewal (LR). Refer to page 5.1-65, 5.1-66, Fig. 5.1-2, and Fig. 5.1-16, of the PBNP FSAR for a description of the configuration of the containment penetrations. Containment bellows are not provided as part of PBNP containment pressure boundary design. All penetrations with bellows are external to containment and are not subject to containment pressure. Note that the fuel transfer tube penetration has bellows with a leak tight barrier function for refueling water at the refueling cavity and no containment pressure boundary function (See FSAR Fig. 5.1-20).

NRC Question RAI 3.5-2

For seals and gaskets related to containment penetrations, in Item Number 3.5.1-6 of the LRA, containment ISI including containment leak rate testing have been stated as the aging management programs. For equipment hatches and air-locks at PBNP, the staff agrees with the applicant's assertion that the leak rate testing program will monitor aging degradation of seals and gaskets, as they are leak rate tested after each opening. For other penetrations (mechanical and electrical) with seals and gaskets, the applicant is requested to provide information regarding the adequacy of Type B leak rate testing frequency to monitor aging degradation of seals and gaskets at PBNP.

NMC Response:

PNBP is committed to Option B of 10 CFR 50, Appendix J. Regulatory Guide 1.163 stipulates a local leak rate test (LLRT) frequency of up to 60 months for Type C tested penetrations. PBNP employs the same 60-month maximum frequency for all Type B tested penetrations. The penetrations of interest are the ones that utilize an elastomer seal and that are Type B tested. Affected penetrations include the Conax and Westinghouse modular electrical penetration assembles (EPA). Note the majority of the EPAs are of the Westinghouse canister type with no elastomer material.

NRC Question RAI 3.5-3

In Section 3.5.2.2.1.3, and in Item 9) of Table 3.5.0-1 (plant-specific response to WCAP-14756-A), the applicant asserts that the concrete temperatures around the high energy piping penetrations are well below the established threshold value of 200°F. However, PB OPR 000096 indicated that the concrete temperatures around the main steam and feed water lines were found to be about 380°F for an unknown period of time. Such sustained temperatures not only affect the concrete compressive strength and its elastic modulus, but they also accentuate the concrete creep and relaxation of prestressing tendons located in the vicinity of high temperature areas. The net effect could be lower tendon forces in these areas. The applicant is requested to provide information regarding the actions taken: (1) to control the concrete temperatures in this areas, (2) to assess the condition of the concrete in these areas, (3) to assess the condition of penetration liners, and (4) to monitor the prestressing forces in the affected tendons. Also, the applicant is requested to discuss the consequences of the sustained high temperatures on the concrete and the prestressing tendons during the extended period of operation.

NMC Response:

Items 1, 2 and 3:

The non-conforming condition is captured in Point Beach's corrective action program, namely:

- Corrective Action Program; CAP 51854, N2 MS Line Containment Penetration Concrete Temp Above FSAR Specified Allowable, 11/15/03
- Operability Recommendation; OPR 96, N2 MS Line Containment Penetration Concrete Temp Above FSAR Specified Allowable, 11/16/03
- Operable But Degraded; OBD 124, U2 MS Line Cont Pen Concrete Temp Above FSAR Specified Allowable - Action Plan, 11/18/03
- Operable But Degraded; OBD 134, Open & Inspect 2 Main Steam & 2 Main Feedwater Penetrations of Unit 2 Containment, 12/17/03

During the next Unit 2 refueling (Spring 2005) the two Main Steam penetrations will be opened and inspected. The penetrations will be restored to their original design conditions as required. The original design conditions are detailed in the FSAR page 5.1-51 and Figure 5.1-17. There is no evidence of high temperatures at the Main Feedwater penetrations. If inspection of the Main Steam penetrations confirms an adverse condition, the Main Feedwater penetrations will be re-evaluated for extent of condition.

Item 4:

PBNP Tendon Surveillance Program, including inspection frequencies and acceptance criteria, is in accordance with the 1992 Edition through 1992 Addenda of the ASME Boiler and Pressure Vessel Code, Subsection IWL, within the limitations and modifications required by Title 10 of the Code of Federal Regulation, Part 50.55a, Codes and Standards and Regulatory Guide 1.35, Revision 3, July 1990. The program includes tendon prestressing force inservice inspection and monitoring of time-dependent and other losses. The liftoff monitoring test monitors all losses including relaxation of prestressing steel and effects of variations in temperatures. To date, comparison of the measured tendon forces against the predicted forces at the time of the lift-off has been well above the lower predicted limit.

The non-conforming high temperature main steam line containment penetration could have an affect on the hoop tendons. This condition was evaluated and documented in Operability Recommendation OPR 96. The tendon exposed to the slightly higher temperature occurred over a relatively short length and it was determined to present a negligible effect. Consideration will be given to include one of these "random" tendons for testing during the next regularly scheduled surveillance test for that Unit.

NRC Question RAI 3.5-4

In discussion of Item 3.5.1-12 in Section 3.5.2.2.1.4, the applicant notes that the liner corrosion has been found in both the PBNP Units due to borated water leakage, and that the applicant is performing Subsection IWE augmented inspections in these areas. The applicant is requested to provide a quantitative summary of extent of liner corrosion found in each unit, and the corrective actions taken. The applicant is requested to include a discussion of acceptable liner plate corrosion before it is reinstated to its nominal thickness.

NMC Response:

The areas of concern include the bottom containment liner plate (floor), which is covered by an eighteen inch thick concrete floor, and SW and CCW penetrations. The penetrations have detectable pitting in the flued head region. On occasion, spilled borated water has seeped into the liner plate floor crevice. The liner plate floor receives UT measurements at selected locations. To date, liner plate material loss has been minimal with no adverse effect to the pressure boundary function. In addition, the sump within Sump A had coating degradation at the scum line but no notable material loss.

Components that do not meet the acceptance standards of IWE-3500 shall be corrected by repair, replacement or evaluation. Acceptance of degradation that may affect either the containment structural integrity or leak tightness may be by engineering evaluation. The engineering evaluation is performed on a case by case basis. There is no absolute limit for material loss exceeding a percentage of nominal containment wall thickness that would necessitate a repair to restore nominal thickness. The acceptance criteria are based on the effect or impact it would have on the containment's structural integrity or leak tightness.

NRC Question RAI 3.5-5

The further evaluation in Section 3.5.2.2.1.3 associated with line Item 3.5.1-27 (Table 3.5.1) of the LRA indicates that the reactor cavity cooling sub-system maintains acceptable ambient temperature at the primary shield and reactor vessel support structure. The applicant is requested to provide the following information related to the concrete temperatures and monitoring activities in the primary shield and reactor vessel support areas for PBNP Units 1 and 2:

a. The operating experience related to the functioning of the reactor cavity cooling sub-system including a range of temperatures maintained between the reactor vessel and the primary shield wall, and at the reactor vessel support, and means of monitoring these temperatures;

b. If a separate cooling system is installed to cool the primary shield wall concrete, provide the operating experience related to the functioning of this system, and means used to monitor the primary shield concrete temperatures; and

c. A summary of the results of the last inspection performed in these areas, such as concrete cracking, spalling, pop-outs, etc.

NMC Response:

a. Primary concrete shielding and its temperature are discussed on page 11.6-3 of the FSAR. The Reactor Cavity Cooling System (VNRC) consists of two fans and two cooling coils (one per fan). The fans draw containment air over the service water cooling coils where the air is dehumidified and cooled. The fans discharge into a common duct which supplies cooled air to the reactor vessel annulus for cooling the primary shield wall and nuclear instrumentation immediately external to the reactor. Normally, one fan and cooling coil set is in operation with the other set in standby. The VNRC is not within the scope of license renewal.

The reactor cavity cooling fans are started manually from the control room. Only one fan and service water cooler is required for operation as each fan and cooler are sized for 100% capacity. Service water flow through the coolers is manually controlled.

A flow switch on the fan outlet indicates and alarms low flow conditions on the control room control board. Temperature elements located in various areas provide temperature information to the Plant Process Computer System.

b. There is no separate cooling system employed other than the Reactor Cavity Cooling System.

c. The reactor vessel sump area is presently inspected by the IWE program, but only for pressure boundary items. Also, inspections for component supports in this area are conducted, as are inspections for the reactor vessel lower head.

Enhancements are required to the Structural Monitoring Program (SMP) to address the containment non-pressure boundary internal structure inspections. The SMP will be enhanced to explicitly conduct and document a structural condition survey for this area.

NRC Question RAI 3.5-6

Section 3.5.2.2.2.1, "Aging of Structures Not Covered by Structures Monitoring Program," of the LRA (Page 3.5-385) states that since the embedded steel is not exposed to an environment which is considered aggressive, loss of material, cracking, and loss of bond due to corrosion of embedded steel are not probable aging effects at PBNP and have not been observed to date. Based on the staff's past review experience, many cases of corroded embedded steel (rebars and/or anchors) were identified even the reinforced concrete elements exposed to the environment which is not aggressive. The applicant is requested to provide basis for its statement.

NMC Response:

The following references were the source for the aging effects determination for embedded steel in concrete:

- EPRI, TR-103842, Class 1 Structures License Renewal Industry Report; Revision 1, July 1994, Section 4.2
- EPRI, TR-103835, PWR Containment Structures License Renewal Industry Report; Revision 1, July 1994, Section 4.1.5
- Westinghouse, WCAP-14756-A, Aging Management Evaluation for Pressurized Water Reactor Containment Structure, May 2001, Section 3.2.10
- GALL Vol. II, Item III.A1.1-e

NRC Question RAI 3.5-7

Regarding the aging mechanism related to settlement, Section 3.5.2.2.2.1, "Aging of Structures Not Covered by Structures Monitoring Program," of the LRA (Page 3.5-386) states that all structures at PBNP are either founded on spread footings, basemats, or basemats with steel foundation piles that are driven to refusal. Settlement monitoring and structural inspections indicate no visible evidence of uneven or excessive settlement since construction of the station. Therefore, the applicant concludes that cracking, distortion, and an increase in component stress levels due to settlements are not probable aging effects at PBNP and have not been observed to date.

Based on the staff's experience, as long as the structural foundations are founded on soils, even with spread footings, basemats, or basemats with steel piles driven to the refusal, etc., it is expected that settlements will occur, especially for the sandy soil. These settlements, in most cases, cannot be detected by visual inspection. The applicant is requested to provide additional information and clarify that the statement, "settlement monitoring and structural inspections indicate no visible evidence of uneven or excessive settlement since construction of the station," is based on the measurement instead of visual observation or judgment. Otherwise, there is a need for the further evaluation of aging management as recommended by NUREG-1801.

NMC Response:

Consolidation of soils beneath building foundations typically occurs within the first three to four years after construction. Consolidation of the soil after that time frame is typically negligible. PBNP has a facilities settlement monitoring program, reference NP 7.7.9, Attachment E and drawing Bechtel drawing 6118-C-102. During original plant construction, numerous bench marks were established throughout the plant. The bench marks were first surveyed in the fall of 1969. Subsequent surveys have been performed and differential settlement values determined. To date, the average differential settlement, average of all bench marks, is 0.636 inches. The maximum differential settlement between any of the points (non-adjacent) is 1.296 inches. Settlement monitoring will continue during the period of extended operation.

NRC Question RAI 3.5-8

Section 3.5.2.2.2.2, "Aging Management of Inaccessible Areas," of the LRA (Page 3-387) states that since the below-grade/lake water environment is non-aggressive and the structures monitoring program requires periodic monitoring of ground/lake water to verify chemistry remains non-aggressive, the loss of material and change in material properties due to aggressive chemical attack are not probable aging effects at PBNP. Also, since the embedded steel is not exposed to an environment which is considered aggressive, loss of material, cracking, and loss of bond due to corrosion of embedded steel are not probable aging effects at PBNP. The staff agrees with this statement only for the case of uncracked reinforced concrete elements. However, the inaccessible concrete components such as exterior walls below grade and embedded structural foundations may crack due to settlement and corrosion of reinforcing steel may be expected. The applicant is requested to provide additional information to justify the validity of the LRA statement.

NMC Response:

See response to RAI 3.5-6. In addition, inspection of all PBNP concrete structures and buildings within the scope of license renewal look for signs of concrete distress–cracking, rust staining, spalling–from any aging effect/source type.

NRC Question RAI 3.5-9

Item 3.5.1-21 of LRA Table 3.5.1, "Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and component Supports," states that the aging management program will be plant-specific, and the "Discussion" column of the table refers to LRA Section 3.5.2.2.2.2. However, there is no plant-specific aging management program described in this LRA section. Clarification is needed by the applicant.

NMC Response:

Line Item Table 3.5.1-21, "Discussion" column, dealing with inaccessible concrete areas points to Section 3.5.2.2.2.2 for further evaluation. Section 3.5.2.2.2.2 concludes that there are no aging effects for this line item. Table 3.5.1-21 makes reference to a plant-specific program if an aggressive below-grade environment exists, which it does not. Therefore, no plant-specific program is needed or identified.

NRC Question RAI 3.5-10

In Section 3.5.2.2.2.1, "Aging of Structures Not Covered by Structures Monitoring Program," of the LRA (Page 3-385), the applicant stated that the Structures Monitoring Program requires periodic monitoring of ground/lake water to verify chemistry remains non-aggressive. However, our review of the Structures Monitoring Program (Item B2.1.20 of Appendix B to the LRA) found that there is no program commitment to monitor the ground/lake water chemistry. Therefore, the applicant is requested to clarify this inconsistency.

NMC Response:

Point Beach has a ground water monitoring program, reference NP 7.7.9, Attachment D and Form PBF-7043. Data has been collected for ground water level and chemical analysis, including pH and chloride determination.

Ground water level measurements and chemical analyses are performed as follows. Initially the frequency for ground water measurements will be once every quarter. Ground water chemistry frequency (pH, chlorides, and sulfates) will be once every three quarters (once every nine months). This will facilitate obtaining the seasonal rotation to see if it has any effect. A number of data points will be obtained with the above frequency. Based on an analysis and trend of the data, a determination will be made as to the appropriate frequency for continued monitoring.

NRC Question RAI 3.5-11

In LRA Table 3.5.2-2, the applicant indicates that aging effects (changing material properties and loss of material of all wood/door with the intended function of missile barrier are to be managed by Structures Monitoring Program. However, the staff's review of Item B2.1.20 of Appendix B to the LRA found that the scope of the Structures

Monitoring Program does not include wood components. The applicant is requested to clarify how these aging effects are to be managed.

NMC Response:

The SMP, as detailed in LRA Appendix B, provides a detailed discussion of the ten program elements. The element "Parameters Monitored or Inspected" does not explicitly make reference to wood material. This was an oversight, as this item is presented in Table 3.5.2-2 on page 3-446. During the annual LRA update process, this omission will be corrected.

NRC Question RAI 4.5-1

The use of 10 CFR 54.21(c)(1)(ii) and (iii) is appropriate for concrete containment tendon prestress TLAA. However, the staff need to assess the plant specific operating experience regarding the residual prestressing forces in the containments and the methods used to arrive at the projected prestress forces. Based on the analysis performed as per 10 CFR 54.21(c)(1)(ii), the applicant is requested to provide the following information:

a. The estimated upper and lower bound lines, and the minimum required prestressing forces for each group of tendons for each containment.

b. Trend lines of the projected prestressing forces for each group of tendons based on the regression analysis of the measured prestressing forces (see NRC Information Notice 99-10 for more information). Also, show the actual measured prestressing forces that were used to obtain the trend lines.

c. Plots showing comparisons of prestressing forces projected to 40 years and 60 years with the minimum required prestress (or MRV) for each group of tendons for each containment.

NMC Response:

Items a and c:

A set of tendon prestressing plots have been developed in accordance with RG 1.35.1, reference Calculation 2000-0056, Tendon Prestress Acceptance Limits, Rev. 0. The plots for 60 years (6 total) include the upper and lower bound lines and the minimum required prestressing force for each group of tendons for each of the containments per RG 1.35.1.

The response to item b. is after the plots below.

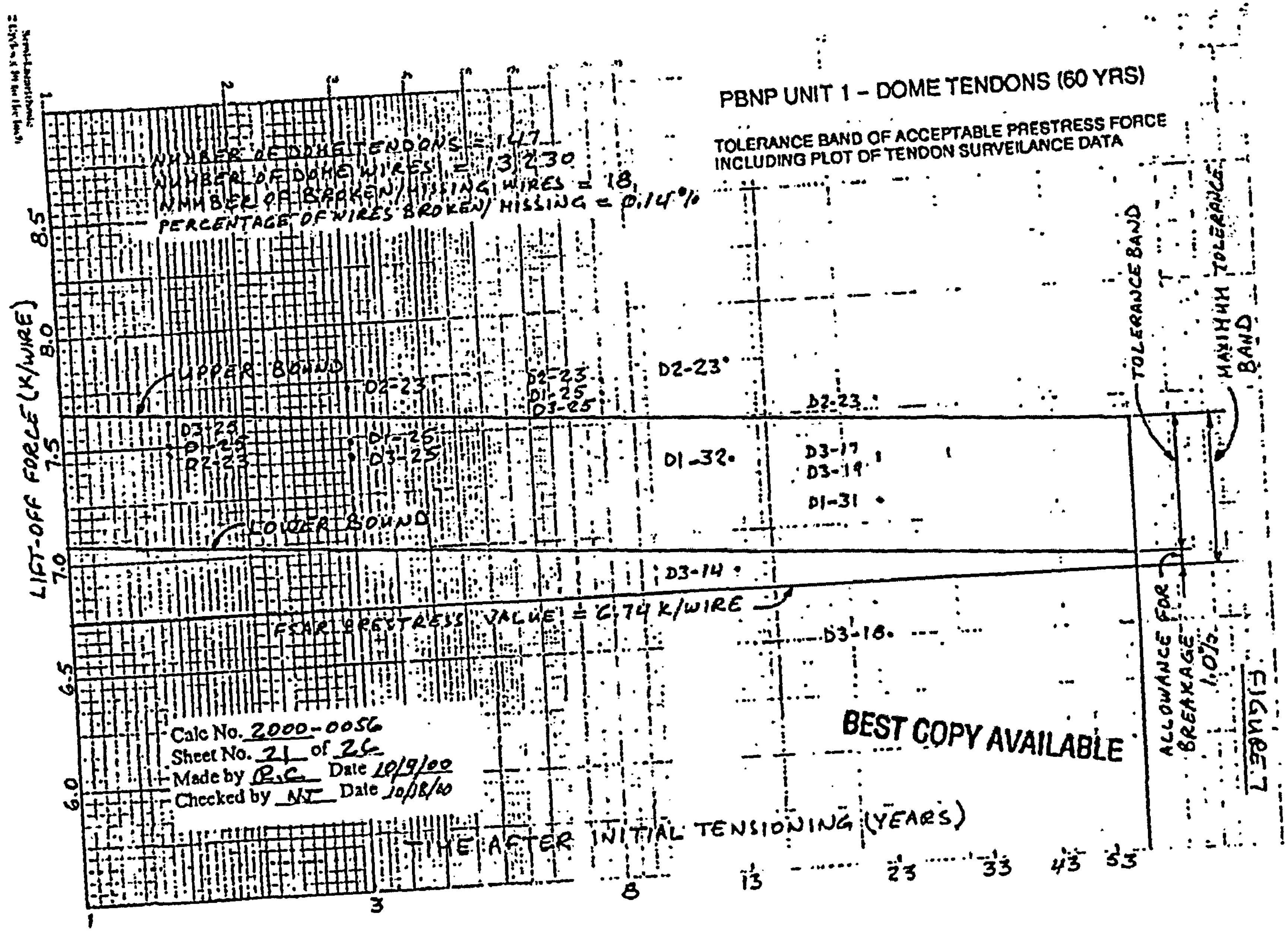
PBNP UNIT 1 - DOME TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILANCE DATA
NUMBER OF DOME TENDONS = 147
NUMBER OF DOME WIRES = 13230
NUMBER OF BROKEN/MISSING WIRES = 18
PERCENTAGE OF WIRES BROKEN/MISSING = 0.14%
LIFT-OFF FORCE (K/WIRE)
UPPER BOUND
LOWER BOUND
FSAR PRESTRESS VALUE = 6.74 K/WIRE
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
TIME AFTER INITIAL TENSIONING (YEARS)
D2-23
D1-25
D3-25
D1-32
D3-17
D3-19
D1-31
D3-14
D3-18
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FIGURE 7
Calc No. 2000-0056
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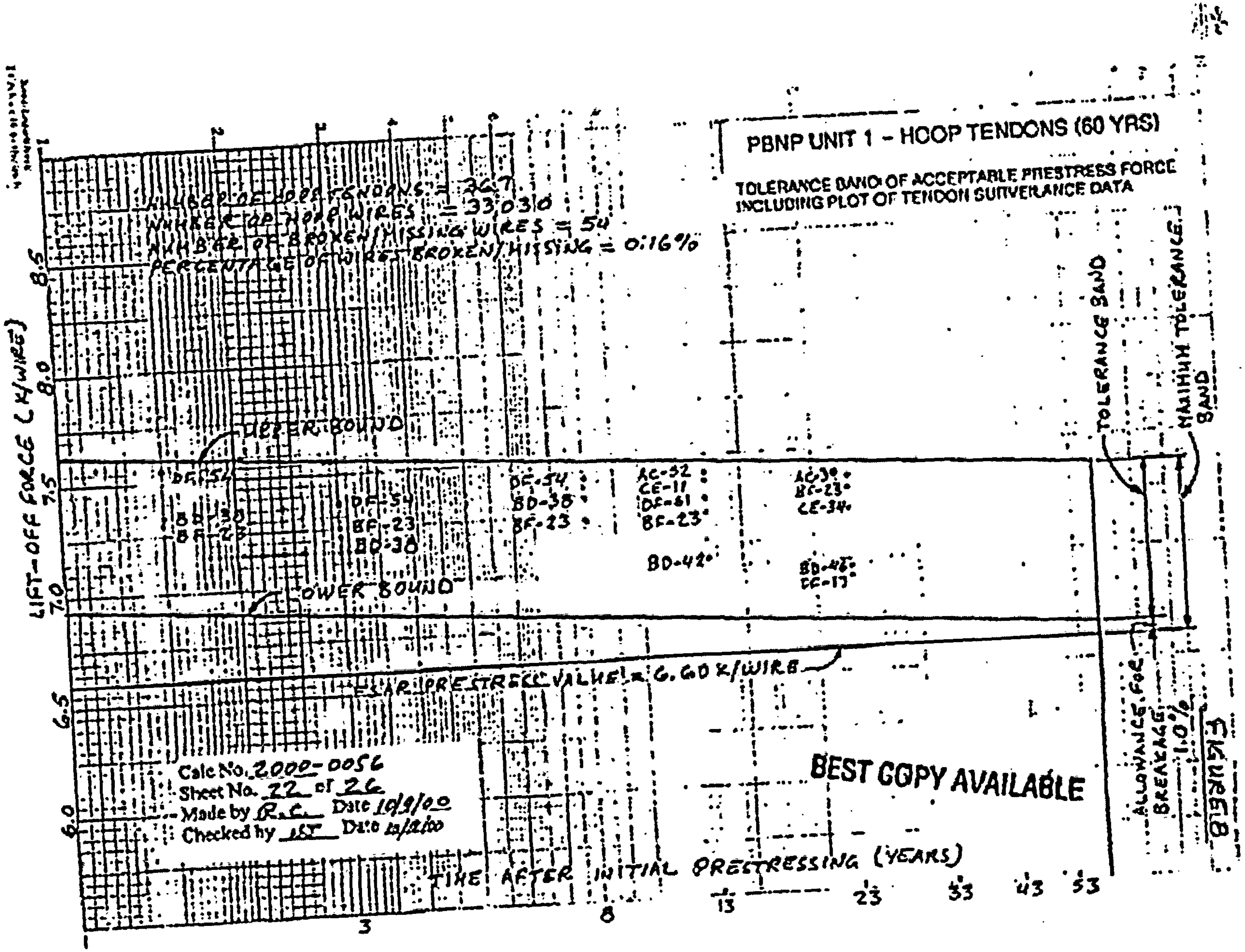
Made by R.C. Date 10/9/00
Checked by NT Date 10/18/00


PBNP UNIT 1 – HOOP TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILANCE DATA
PERCENTAGE OF WIRE BROKEN/MISSING = 0.16%
UPPER BOUND
LOWER BOUND
SAR PRESTRESS VALUE = 6.60 K/WIRE
LIFT-OFF FORCE (K/WIRE)
TIME AFTER INITIAL PRESTRESSING (YEARS)
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
FIGURE B
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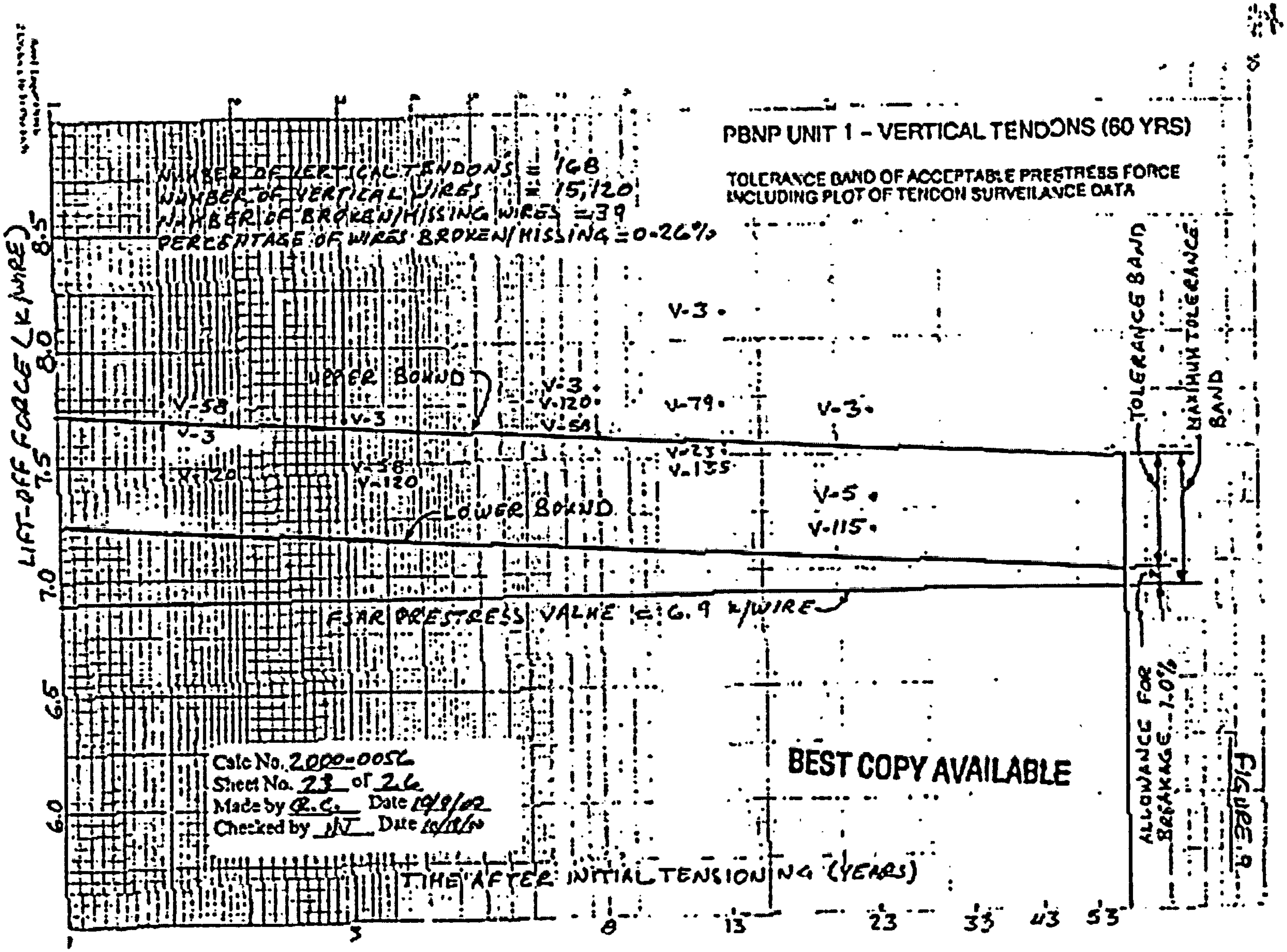
Sheet No. 22 of 26
Made by R.C. Date 10/9/00
Checked by


PBNP UNIT 1 - VERTICAL TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILANCE DATA
NUMBER OF VERTICAL TENDONS = 168
NUMBER OF VERTICAL WIRES = 15,120
NUMBER OF BROKEN/MISSING WIRES = 39
PERCENTAGE OF WIRES BROKEN/MISSING = 0.26%
LIFT-OFF FORCE (K/WIRE)
UPPER BOUND
LOWER BOUND
FSAR PRESTRESS VALUE = 6.9 K/WIRE
TIME AFTER INITIAL TENSIONING (YEARS)
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
FIGURE 8
BEST COPY AVAILABLE
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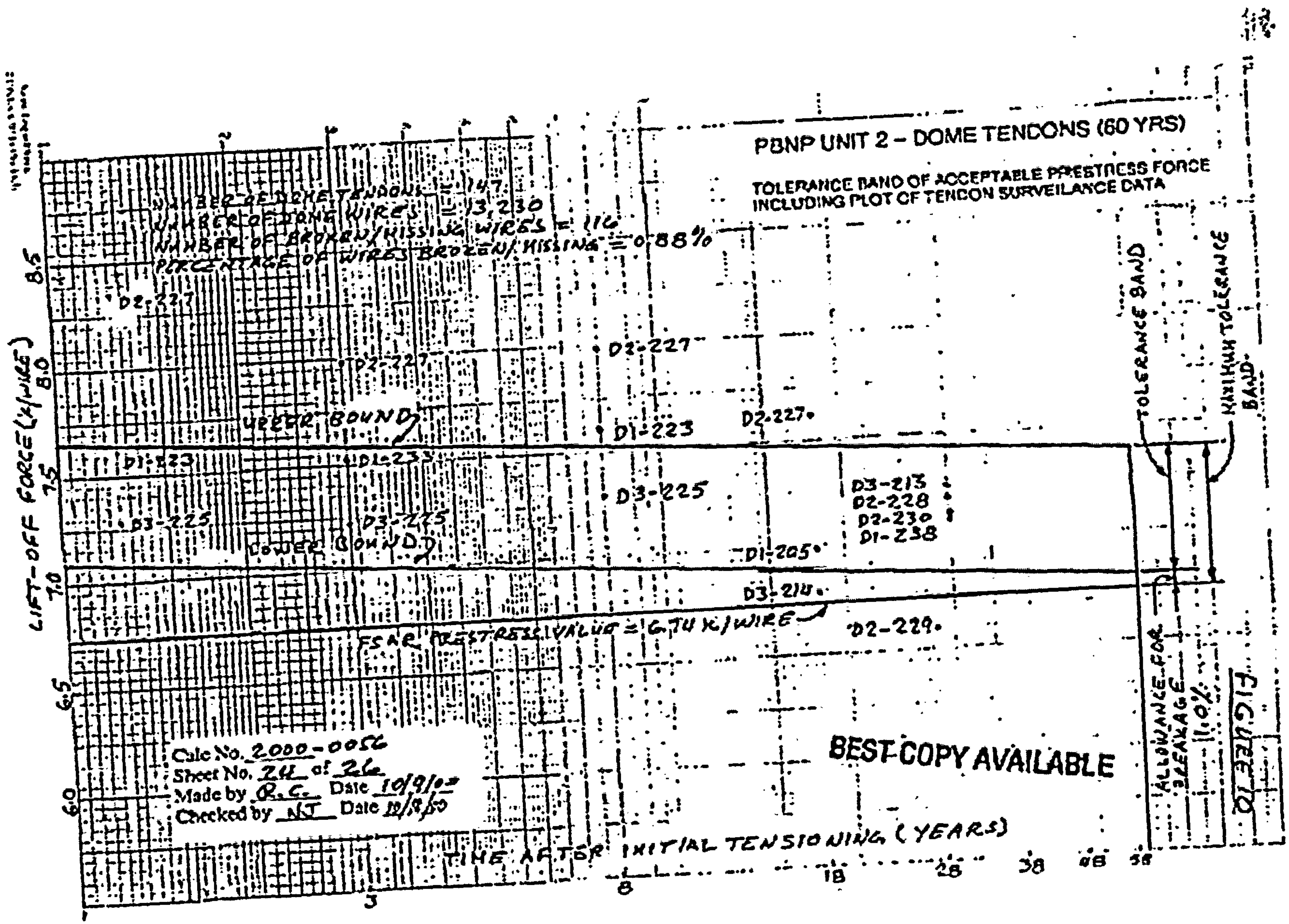
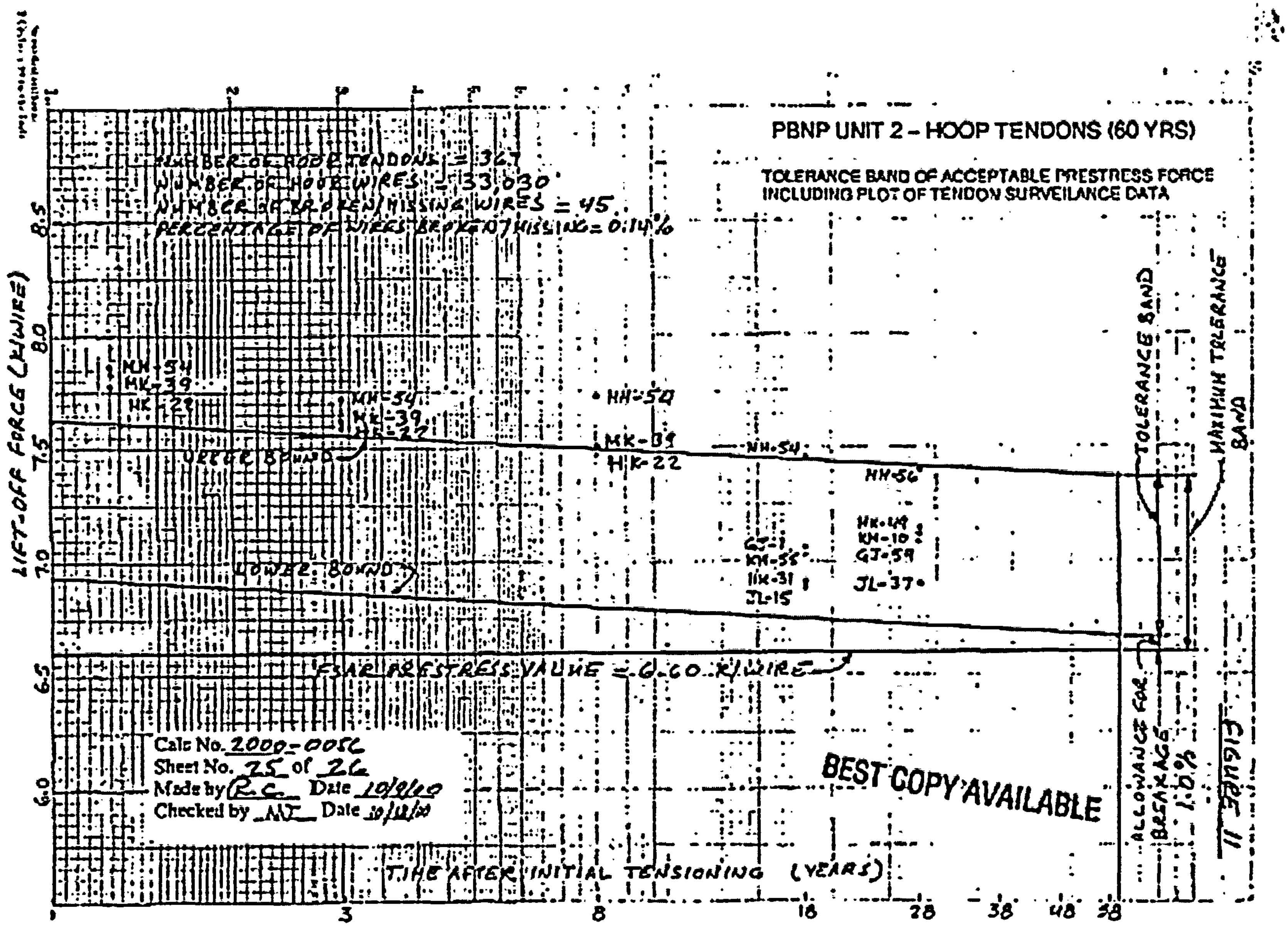
Checked by NT Date 10/18/02


PBNP UNIT 2 – DOME TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILANCE DATA
NUMBER OF DOME TENDONS = 147
NUMBER OF DOME WIRES = 13,230
NUMBER OF BROKEN/MISSING WIRES = 116
PERCENTAGE OF WIRES BROKEN/MISSING = 0.88%
LIFT-OFF FORCE (K/WIRE)
UPPER BOUND
LOWER BOUND
FSAR PRESTRESS VALUE = 6.74 K/WIRE
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
FIGURE 10
TIME AFTER INITIAL TENSIONING (YEARS)
BEST COPY AVAILABLE
Calc No. 2000-0056
Sheet No. 24 of 26
Made by R.C. Date 10/9/00
Checked by NJ Date 10/9/00


PBNP UNIT 2 – HOOP TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILANCE DATA
NUMBER OF HOOP TENDONS = 367
NUMBER OF HOOP WIRES = 33,030
NUMBER OF BROKEN/MISSING WIRES = 45
PERCENTAGE OF WIRES BROKEN/MISSING = 0.14%
LIFT-OFF FORCE (K/WIRE)
8.5
8.0
7.5
7.0
6.5
6.0
UPPER BOUND
LOWER BOUND
FSAR PRESTRESS VALUE = 6.60 K/WIRE
TIME AFTER INITIAL TENSIONING (YEARS)
3
8
18
28
38
48
58
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
FIGURE 11
Calc No. 2000-0056
Sheet No. 25 of 26
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Checked by MT Date 10/12/00
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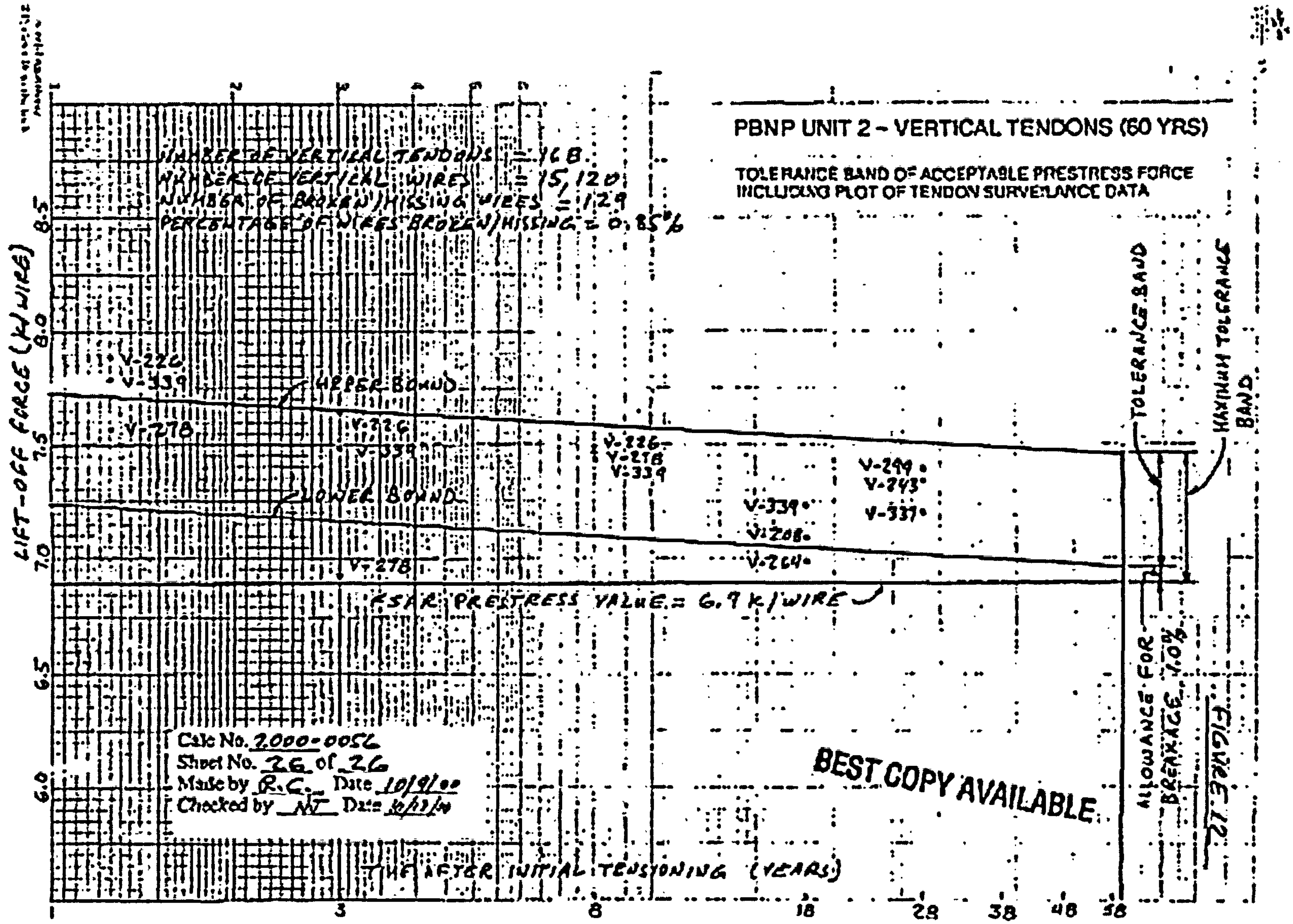
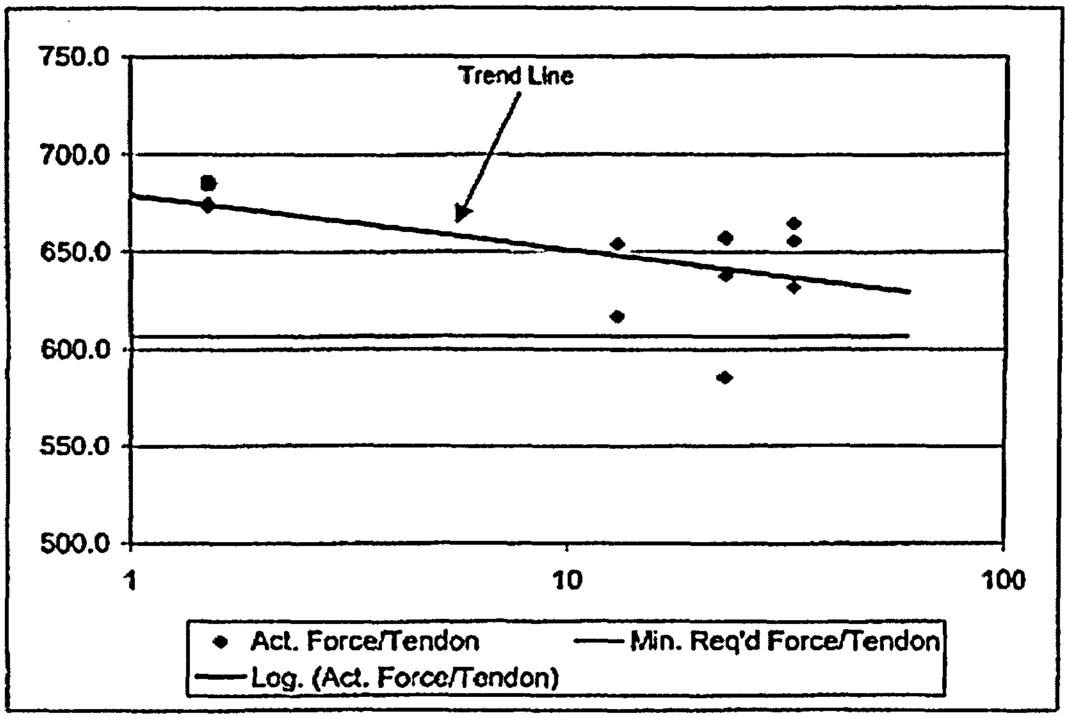


PBNP UNIT 2 - VERTICAL TENDONS (60 YRS)
TOLERANCE BAND OF ACCEPTABLE PRESTRESS FORCE INCLUDING PLOT OF TENDON SURVEILLANCE DATA
NUMBER OF VERTICAL TENDONS = 168
NUMBER OF VERTICAL WIRES = 15,120
NUMBER OF BROKEN/MISSING WIRES = 129
PERCENTAGE OF WIRES BROKEN/MISSING = 0.85%
LIFT-OFF FORCE (K/WIRE)
UPPER BOUND
LOWER BOUND
FSAR PRESTRESS VALUE = 6.9 K/WIRE
TIME AFTER INITIAL TENSIONING (YEARS)
TOLERANCE BAND
MAXIMUM TOLERANCE BAND
ALLOWANCE FOR BREAKAGE 1.0%
FIGURE 12
BEST COPY AVAILABLE
Calc No. 2000-0056
Sheet No. 26 of 26
Made by R.C. Date 10/9/00
Checked by NT Date 10/12/00

Item b:

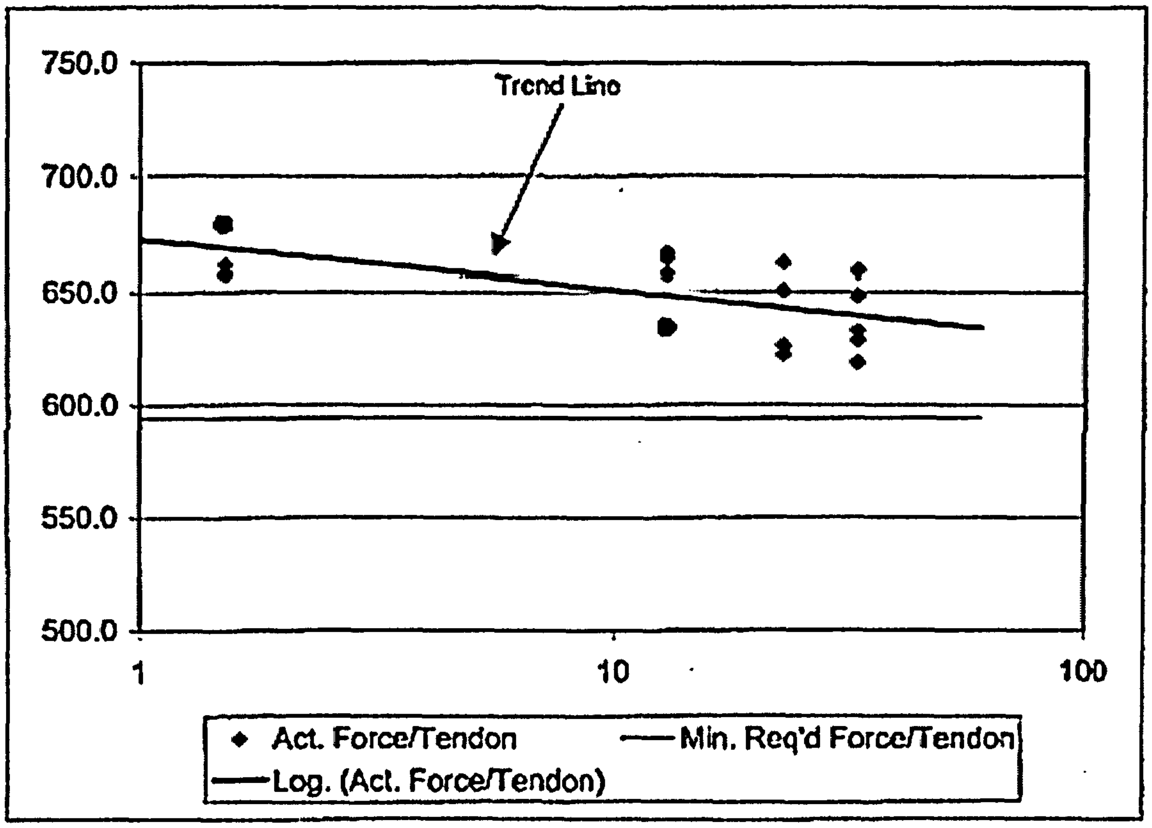
Also included are the prestressing plots with the trend lines of the projected prestressing forces for each group of tendons out to 60 years. The trend lines were developed using linear regression analysis and all of the individual lift-off force data from all of the tendon surveillances to date. This technique/guidance was provided by the NRC in a teleconference on July 13, 2004 with Hansraj G. Ashar. Note that this trend line information is based upon a draft calculation. If the final approved calculation comes to a different conclusion, NMC will provide that information.

UNIT 1 DOME TENDONS
Actual Force Trend



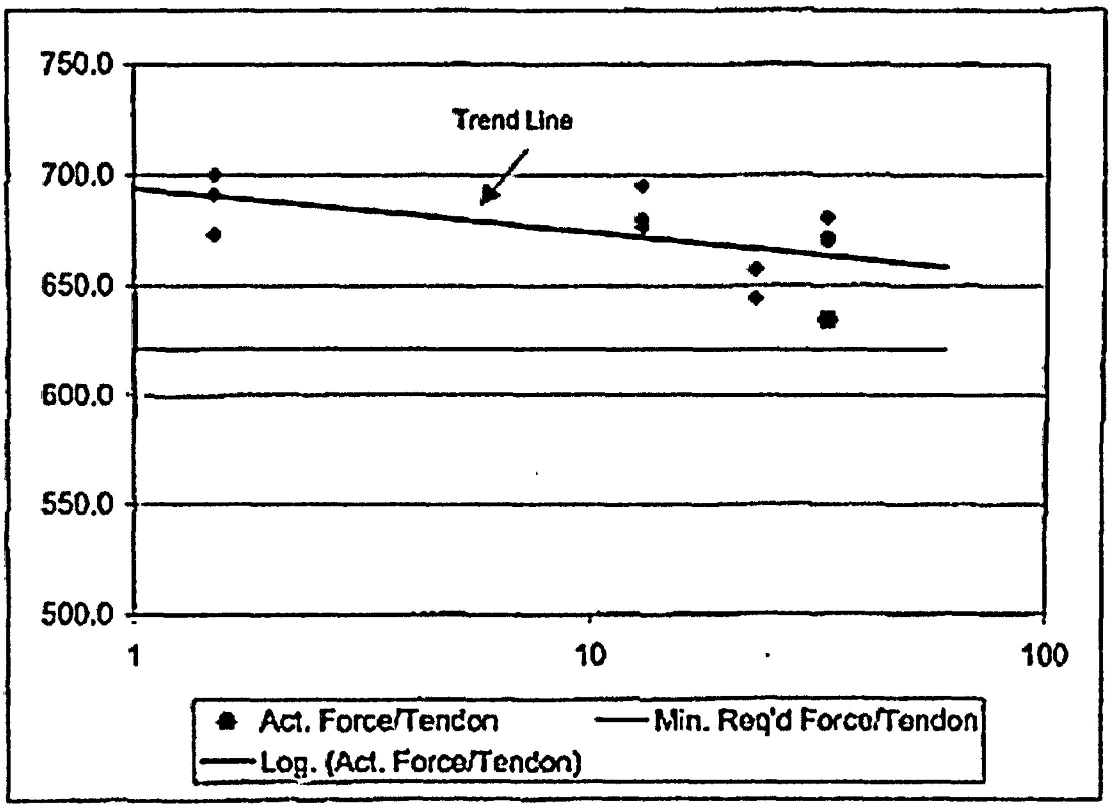
Year	Actual		Year	Actual
1.5	675.0		23	656.5
1.5	673.0		33	655.5
1.5	685.5		33	632.0
13	653.8		33	664.4
13	616.9			
23	637.85			
23	657.15			
23	585.3			

UNIT 1 HOOP TENDONS
Actual Force Trend



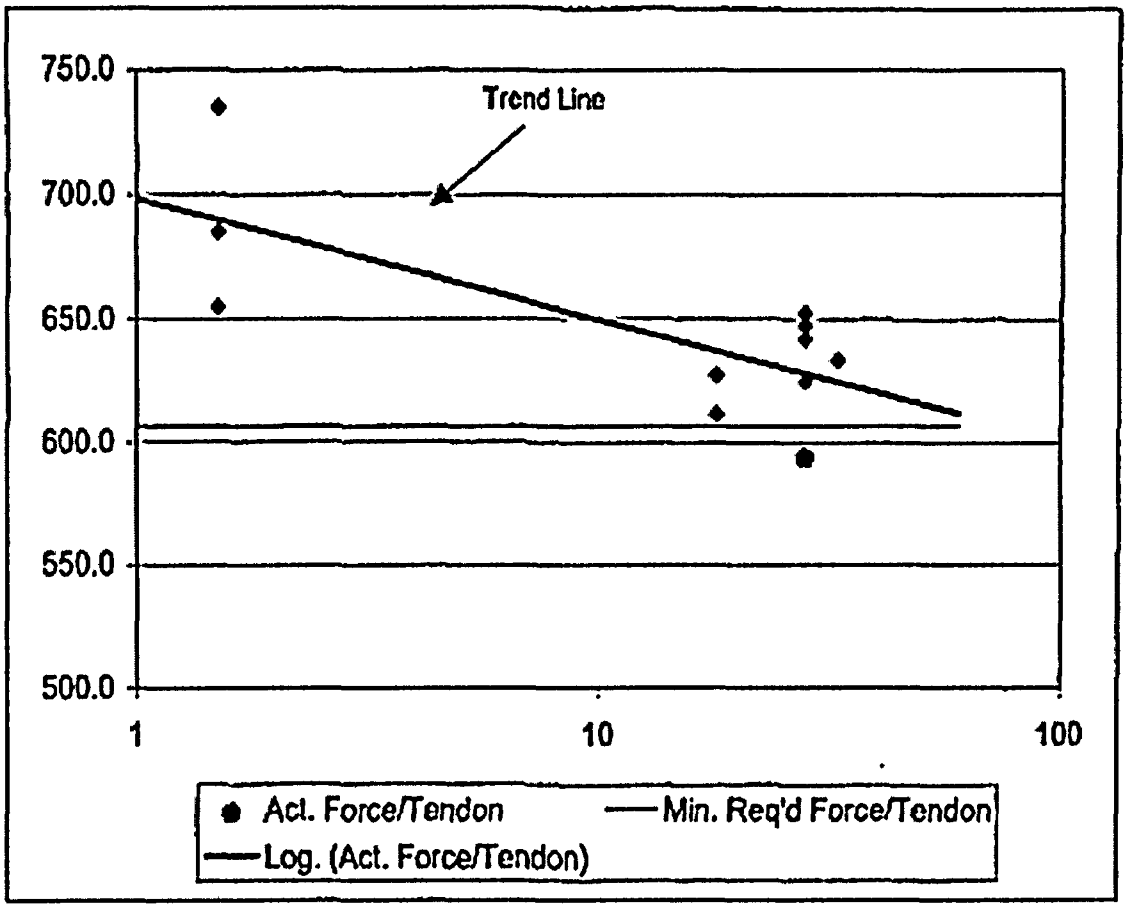
Year	Actual		Year	Actual
1.5	657.5		23	662.0
1.5	661.0		23	650.5
1.5	679.5		23	622.45
13	634.5		33	648.2
13	666.5		33	618.9
13	664.0		33	658.7
13	657.5		33	633.0
23	626.35		33	628.8

UNIT 1 VERTICAL TENDONS
Actual Force Trend



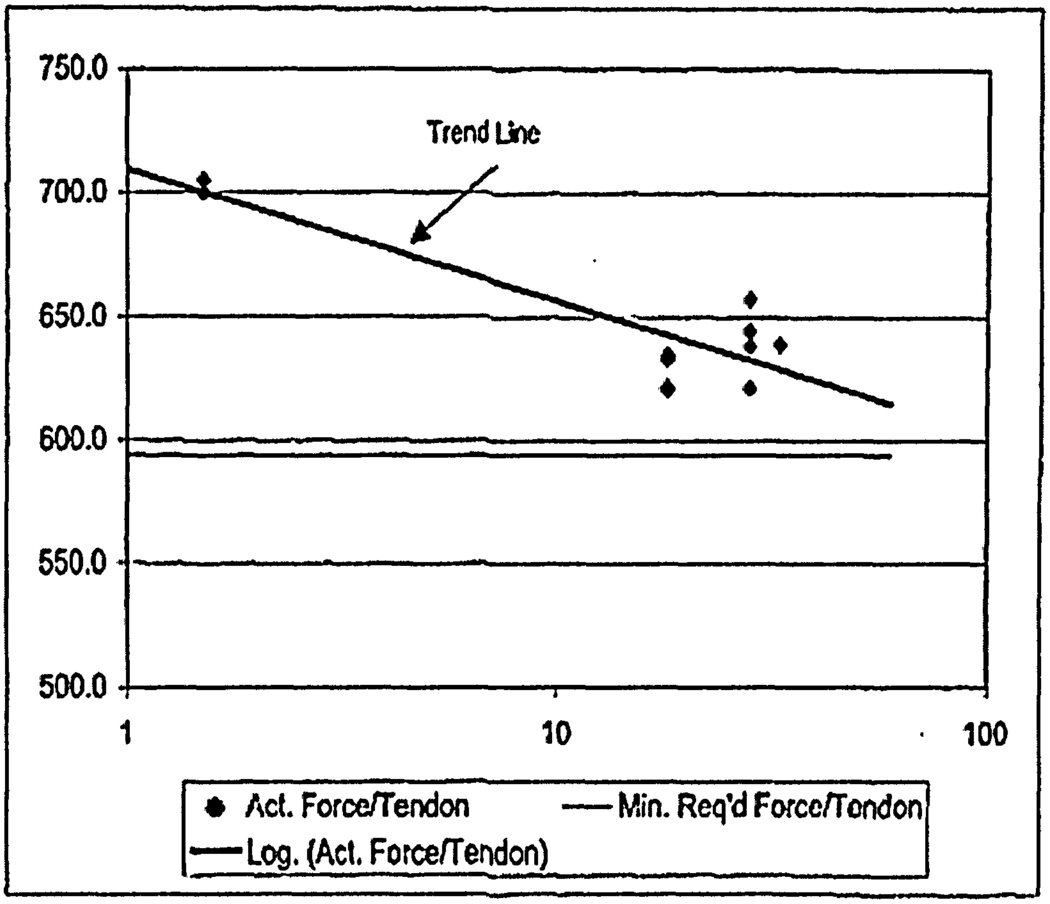
Year	Actual		Year	Actual
1.5	691.0		23	644.0
1.5	700.0		33	680.3
1.5	673.0		33	669.6
13	679.3		33	671.5
13	695.0		33	634.6
13	676.0			
23	657.1			

UNIT 2 DOME TENDONS
Actual Force Trend



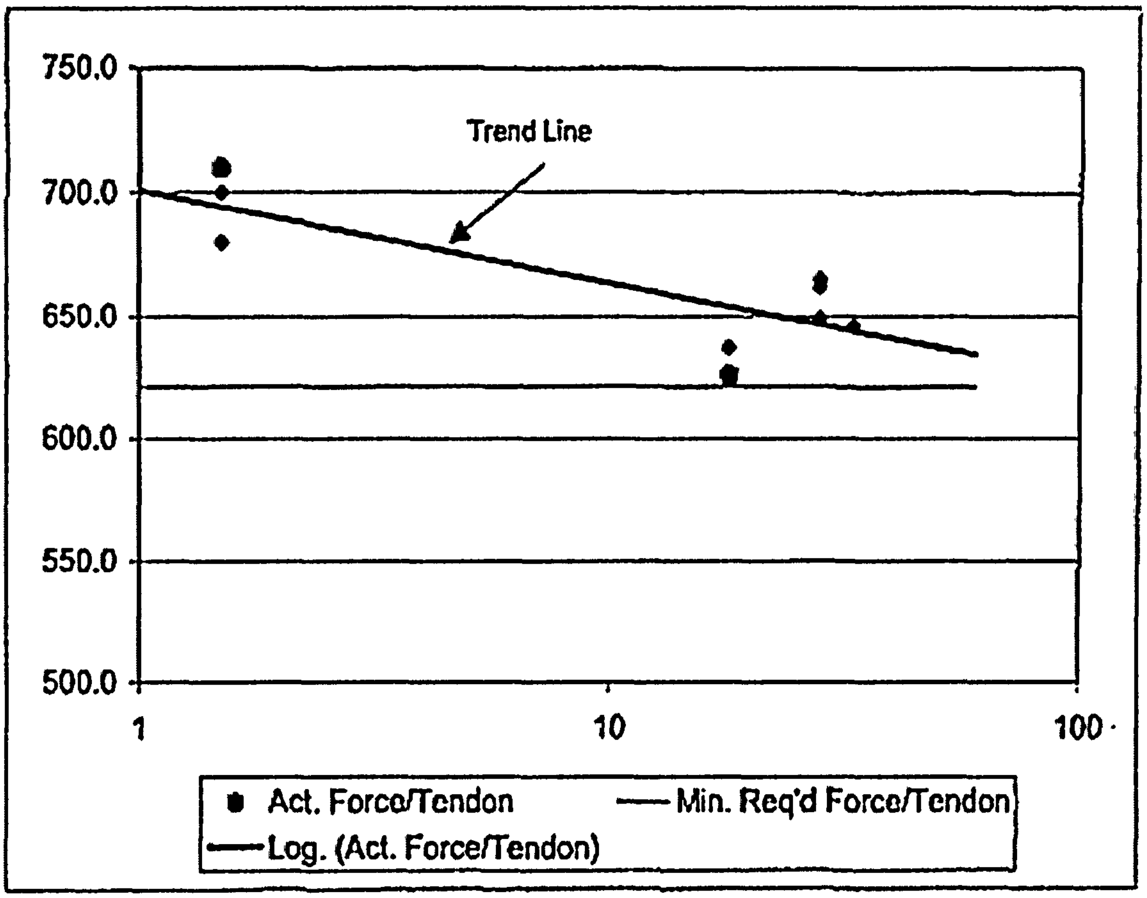
Year	Actual		Year	Actual
1.5	685.0		28	594.0
1.5	735.0		28	642.0
1.5	655.0		28	652.5
18	627.5		33	633.6
18	611.5			
28	625.0			
28	647.5			

UNIT 2 HOOP TENDONS
Actual Force Trend



Year	Actual		Year	Actual
1.5	700.0		28	621.0
1.5	705.0		28	638.0
1.5	705.0		28	644.0
18	634.5		28	644.5
18	620.5		28	657.0
18	621.5		33	638.7
18	633.0			

UNIT 2 VERTICAL TENDONS
Actual Force Trend



Year	Actual		Year	Actual
1.5	710.0		28	649.0
1.5	680.0		33	646.0
1.5	700.0			
18	637.0			
18	626.0			
28	662.0			
28	665.0			

NRC Question RAI 4.5-2

In Section 15.3.1 of Appendix A of the LRA, the applicant notes the "Prestressed Concrete Containment Tendon Surveillance Program," as an activity related to this TLAA. The applicant's description is qualitative. For the summary to be meaningful, as a minimum, the applicant should provide a Table showing the minimum required prestressing forces and the projected (to 60 years) prestressing forces for each group of tendons which would demonstrate the validity of the program and the corresponding TLAA results. The applicant is requested to supplement this information in Section 15.3.1 of Appendix A of the UFSAR Supplement.

NMC Response:

The minimum required prestressing forces are interrupted to mean the "final effective stress" at 60 years as discussed in the FSAR. The final effective stress was chosen to be the same value for 40 or 60 years. Tabulated below are the final effective stress requirements and the projected prestressing forces (at 40 and 60 years) for each group of tendons. Note this 40 and 60 year information is based upon a draft calculation. If the final approved calculation comes to a different conclusion, NMC will provide that information.

Unit 1

Tendon Type	Trend Line Values for Unit 1 (kips)				Final Effective Stress ($kips/in^2$) (3)
	40 Years		60 Years		
	Per Wire Basis (1)	Per Tendon Basis (2)	Per Wire Basis (1)	Per Tendon Basis (2)	
Dome	7.05	634.3	6.99	629.4	137.4
Hoop	7.09	637.8	7.05	634.1	134.5
Vertical	7.35	661.6	7.31	658.0	140.6

(1) The area per wire is Aw = 0.0490874 sq-in.

(2) Each tendon has a nominal 90 wires per tendon.

(3) Reference, FSAR, Section 5.1.2.4, page 5.1-61.

Unit 2

Tendon Type	Trend Line Values for Unit 2 (kips)				Final Effective Stress (kips/in^2) (3)
	40 Years		60 Years		
	Per Wire Basis (1)	Per Tendon Basis (2)	Per Wire Basis (1)	Per Tendon Basis (2)	
Dome	6.91	620.5	6.81	612.0	137.4
Hoop	6.96	624.3	6.86	615.0	134.5
Vertical	7.12	640.9	7.05	634.3	140.6

(1) The area per wire is Aw = 0.0490874 sq-in.
(2) Each tendon has a nominal 90 wires per tendon.
(3) Reference, FSAR, Section 5.1.2.4,page 5.1-61.

The final effective stress values presented are the values found on page 5.1-61 of the FSAR, Section 5.1.2.4, therefore Section 15.3.1 of Appendix A of the LRA does not require revision.