UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

October 5, 1992

Docket Nos. 50-338
and 50-339

Mr. W. L. Stewart
Senior Vice President - Nuclear
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, Virginia 23060

Dear Mr. Stewart:

SUBJECT: NORTH ANNA UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS RE: SETTLEMENT MONITORING AND ALLOWABLE DIFFERENTIAL SETTLEMENT LIMITS (TAC NOS. M82916 AND M82917)

The Commission has issued the enclosed Amendment Nos. 167 and 147 to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). The amendments revise the Technical Specifications (TS) in response to your letter dated October 2, 1989, as supplemented by letters dated April 29 and August 24, 1992.

The amendments delete from the NA-1&2 TS 3/4.7.12 the settlement monitoring of most of the Category I structures and increase the allowable differential settlement limits for certain structures. The amendments delete from the NA-1&2 TS 47 out of 51 markers located in the main plant area and 5 out of 17 markers located in the Service Water (SW) area. The amendments reduce the total number of settlement markers being monitored from 68 to 16.

As noted in the enclosed Safety Evaluation, you have committed in your letter dated August 24, 1992, to the following actions to demonstrate that your quality control procedures for your settlement monitoring program are adequate.

1. VEPCO will submit to NRC, after the TS are changed, the results of the next 4 semi-annual surveys of the 16 markers (which will continue to be monitored) so that NRC can review them and verify that proper quality control is being exercised in settlement monitoring of Category I structures. The survey results will be submitted no later than 60 days after the completion of each semi-annual survey.

2. VEPCO will maintain all the settlement points deleted from the TS to the extent practicable; it will not initiate actions to physically remove existing settlement points. However, VEPCO will not relocate any point that may be obscured or removed due to a future design change. VEPCO has stated, in this connection, that its past experience indicates that design changes of such a nature seldom occur.

CP-1

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A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,
(Original Signed By)

Leon B. Engle, Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 167 to NPF-4
2. Amendment No. 147 to NPF-7
3. Safety Evaluation

cc w/enclosures:
See next page

Distribution
Docket File
NRC & Local PDRs
PDII-2 Reading
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G. Hill (8), P-137
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ACRS (10)
OPA
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M. Sinkule, RII
R. Pichumani, 7/H/15
A. Lee, 7/E/23

Subject to comment be. ~~25~~ incorporated

OFC	:LA:PDII-2	:PM:PDII-2	:D:PDII-2	:OGC-NLO	:	:
	MBerk	LE	BCB for	MZOBLER		
NAME	:DMiller	:LEngle:kdj	:H. Berkow	:MZOBLER	:	:
DATE	:9/28/92	: 9/28/92	: 9/28/92	: 9/3/92	:	:

OFFICIAL RECORD COPY
Document Name: NA82916.AMD

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 167
License No. NPF-4

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company et al., (the licensee) dated October 2, 1992 and supplemented by letters dated April 29 and August 24, 1992, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.D.(2) of Facility Operating License No. NPF-4 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 167 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 5, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 167

TO FACILITY OPERATING LICENSE NO. NPF-4

DOCKET NO. 50-338

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Remove Pages	Insert Pages
3/4 7-70	3/4 7-70
3/4 7-71	3/4 7-71
3/4 7-72	3/4 7-72
B 3/4 7-7a	B 3/4 7-7a
B 3/4 7-8	B 3/4 7-8

PLANT SYSTEMS

3/4.7.12 SETTLEMENT OF CLASS 1 STRUCTURES

LIMITING CONDITION FOR OPERATION

3.7.12.1 The total settlement of each Class 1 structure or the differential settlement between Class 1 structures shall not exceed the allowable values of Table 3.7-5.

APPLICABILITY: ALL MODES

ACTION:

a. With either the total settlement of any structure or the differential settlement of any structures exceeding 75 percent of the allowable settlement, conduct an engineering review of field conditions and evaluate the consequences of additional settlement. Submit a special report to the Commission pursuant to Specification 6.9.2 within 60 days, containing the results of the investigation, the evaluation of existing and possible continued settlement and the remedial action to be taken if any, including the date of the next survey.

b. With the total settlement of any structure or the differential settlement of any two structures exceeding the allowable settlement value of Table 3.7-5, be in at least HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.12.1 The total settlement of each Class 1 structure or the differential settlement between Class 1 structures listed in Table 3.7-5 shall be determined by measurement and calculation at least once per 6 months. The accuracy of the measurements shall be in accordance with second-order Class II accuracy as defined by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1974.

TABLE 3.7-5

ALLOWABLE TOTAL SETTLEMENT OR DIFFERENTIAL SETTLEMENT FOR CLASS 1 STRUCTURES

ITEM NO.	SETTLEMENT POINT	STRUCTURE	SETTLEMENT POINT	STRUCTURE/COMPONENT	ALLOWABLE TOTAL SETTLEMENT (FEET)	ALLOWABLE DIFFERENTIAL SETTLEMENT (FEET)
1	7 or 10	Service Water Pump House	17, 18	North Side of Expansion Joint Service Water Piping at SWPH	N/A	0.220 from 7/77
2	117	*Service Building (E-14)	113	Unit 2 Main Steam Valve House	N/A	0.047 from 7/77
3	17, 18	North Side of Expansion Joint Service Water Piping at SWPH			0.660 from 8/78	N/A
4	114	Service Building (E-17)			0.146 from 5/76	N/A
5	25, 26, 27, 28	Service Water Valve House			0.320 from 4/87	N/A
6	29, 30 31, 32	Service Water Tie-in Vault			0.120 from 4/87	N/A

* Critical differential settlement is downward movement of Point 117 with respect to Point 113.

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3/4.7.12 SETTLEMENT OF CLASS 1 STRUCTURES

In order to assure that settlement does not exceed predicted and allowable settlement values, a program has been established to conduct a survey of a specified number of points at the site on a semi-annual basis. The first survey was conducted in May 1976 to establish baseline elevations for most of the points. Where applicable, the base-line elevations of points established subsequent to the May 1976 survey have been adjusted to the May 1976 survey by an evaluation of the settlement records of settlement points on the same structure or on nearby structures. Baseline elevations for some points were established on dates other than May 1976 as indicated in Table 3.7-5. Additional surveys will be performed semi-annually. The determination of the elevation of the points located in the immediate vicinity of the Service Water Reservoir shall be by precise leveling with second-order Class II accuracy as defined by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1974.

The change in elevation of points 113 and 117 in the main plant area shall be determined by direct measurement from a single instrument set-up. A difference in survey rod readings from the single set-up will establish an initial difference in elevation between the two points. Subsequent readings will determine if there is a change in the initial difference,indicating additional differential movement. Because the differential movement between points 113 and 117 have previously approached the allowable limit, the direct reading method will provide the most accurate data and will minimize random survey error associated with survey loops. The direct reading method will involve equipment and will produce results that are comparable to second-order Class II accuracy.

The change in elevation for point 114, which has more margin between recorded settlement and the allowable limit, will be determined by a short level loop from rock-founded reference monument J, through the points, and back to the monument. This loop will involve a minimum of set-ups and will be performed with second-order Class II accuracy. The loop will also include points 113 and 117 as a check against the direct reading method.

All settlements recorded by the direct reading method will continue to be referenced to the original baseline date for each point to maintain continuity.

When any settlement point listed in Table 3.7-5 is inaccessible during a survey, comparison to allowable settlement shall be based on settlement of other points on the same structure or on nearby structures having similar foundation conditions. When any settlement point listed in Table 3.7-5 is dislocated or replaced, a documented review of the settlement records of points on the same structure and additionally points on nearby structures having similar foundation conditions shall provide a new reference elevation for the point that reflects the estimated settlement since the base-line survey. If the total settlement or differential settlement exceeds 75 percent of the allowable value, the frequency of surveillance shall be increased as dictated by the engineering review.

Allowable differential movement is controlled by pipe deflections permitted by fixation points in buildings. The items limiting differential settlement are as follows:

Item No.	Reference	Monitoring Points	Limiting Item
1	Service Water Pump House	Service Water Piping @ SWPH	Expansion Joint
2	Service Bldg. (E-14)	Unit 2 Main Steam Valve House	24"-WS-426, 428, 434, 436-151-Q3

The items limiting total settlement of structures are as follows:

	Monitoring Points	Limiting Item
3	Service Water Piping at SWPH	36"-WS-1,2-151-Q3
4	Service Building (E-17)	36"-WS-1,2,3,4-151-Q3
5	Service Water Valve House	32½"-WS-D84-151-Q3
6	Service Water Tie-in Vault	36"-WS-1,2-151-Q3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-339

NORTH ANNA POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 147
License No. NPF-7

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company et al., (the licensee) dated October 2, 1989 and supplemented by letters dated April 29 and August 24, 1992, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-7 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 147 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 5, 1992

ATTACHMENT TO LICENSE AMENDMENT NO. 147

TO FACILITY OPERATING LICENSE NO. NPF-7

DOCKET NO. 50-339

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Remove Pages	Insert Pages
3/4 7-53	3/4 7-53
3/4 7-54	3/4 7-54
3/4 7-55	3/4 7-55
3/4 7-56	3/4 7-56
B 3/4 7-7	B 3/4 7-7
B 3/4 7-8	B 3/4 7-8

PLANT SYSTEMS

3/4.7.12 SETTLEMENT OF CLASS 1 STRUCTURES

LIMITING CONDITION FOR OPERATION

3.7.12.1 The total settlement of each Class 1 structure or the differential settlement between Class 1 structures shall not exceed the allowable values of Table 3.7-5.

APPLICABILITY: ALL MODES

ACTION:

a. With either the total settlement of any structure or the differential settlement of any structures exceeding 75 percent of the allowable settlement, conduct an engineering review of field conditions and evaluate the consequences of additional settlement. Submit a special report to the Commission pursuant to Specification 6.9.2 within 60 days, containing the results of the investigation, the evaluation of existing and possible continued settlement and the remedial action to be taken if any, including the date of the next survey.

b. With the total settlement of any structure or the differential settlement of any two structures exceeding the allowable settlement value of Table 3.7-5, be in at least HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.12.1 The total settlement of each Class 1 structure or the differential settlement between Class 1 structures listed in Table 3.7-5 shall be by measurement and calculation at least once per 6 months. The accuracy of the measurement shall be in accordance with second-order Class II accuracy as defined by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1974.

TABLE 3.7-5

ALLOWABLE TOTAL SETTLEMENT OR DIFFERENTIAL SETTLEMENT FOR CLASS 1 STRUCTURES

ITEM NO.	SETTLEMENT POINT	STRUCTURE	SETTLEMENT POINT	STRUCTURE/COMPONENT	ALLOWABLE TOTAL SETTLEMENT (FEET)	ALLOWABLE DIFFERENTIAL SETTLEMENT (FEET)
1	117	*Service Building (E-14)	113	Unit 2 Main Steam Valve House	N/A	0.047 from 7/77
2	7 or 10	Service Water Pump House	17,18	Service Water Piping at SWPH North Side of Expansion Joint	N/A	0.220 from 7/77
3	17, 18	Service Water Piping at SWPH North Side of Expansion Joint			0.660 from 8/78	N/A
4	116	**Service Building (E-15)			0.167 from 5/76	N/A
5	114	Service Building (E-17)			0.146 from 5/76	N/A
6	25,26, 27,28	Service Water Valve House			0.320 from 4/87	N/A
7	29,30, 31,32	Service Water Tie-in Vault			0.120 from 4/87	N/A

* Critical differential settlement is downward movement of Point 117 with respect to Point 113.

** Critical total settlement is downward movement of point 116 with respect to Unit 2 containment which is rock-founded.

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3/4.7.11 SEALED SOURCE CONTAMINATION

The limitations on sealed source removable contamination ensure that the total body or individual organ irradiation does not exceed allowable limits in the event of ingestion or inhalation of the source material. The limitations on removable contamination for sources requiring leak testing, including alpha emitters, is based on 10 CFR 70.39(c) limits for plutonium. Leakage of sources excluded from the requirements of this specification represent less than one maximum permissible body burden for total body irradiation if the source material is inhaled or ingested. Sealed sources are classified into three groups according to their use, with surveillance requirements commensurate with the probability of damage to a source in that group. Those sources which are frequently handled are required to be tested more often than those which are not. Sealed sources which are continuously enclosed within a shielded mechanism (i.e., sealed sources within radiation monitoring or boron measuring devices) are considered to be stored and need not be tested unless they are removed from the shielded mechanism.

3/4.7.12 SETTLEMENT OF CLASS 1 STRUCTURES

In order to assure that settlement does not exceed predicted and allowable settlement values, a program has been established to conduct a survey of a specified number of points at the site on a semi-annual basis. The first survey was conducted in May 1976 to establish baseline elevations for most of the points. Where applicable, the base-line elevations of points established subsequent to the May 1976 survey have been adjusted to the May 1976 survey by an evaluation of the settlement records of settlement points on the same structure or on nearby structures. Baseline elevations for some points were established on dates other than May 1976 as indicated in Table 3.7-5. Additional surveys will be performed semi-annually. The determination of the elevation of the points located in the immediate vicinity of the Service Water Reservoir shall be by precise leveling with second-order Class II accuracy as defined by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1974.

The change in elevation of points 113 and 117 in the main plant area shall be determined by direct measurement from a single instrument set-up. A difference in survey rod readings from the single set-up will establish an initial difference in elevation between the two points. Subsequent readings will determine if there is a change in the initial difference, indicating additional differential movement. Because the differential movement between points 113 and 117 have previously approached the allowable limit, the direct reading method will provide the most accurate data and will minimize random survey error associated with survey loops. The direct reading method will involve equipment and will produce results that are comparable to second-order Class II accuracy.

3/4.7.12 SETTLEMENT OF CLASS 1 STRUCTURES (Continued)

The change in elevation for points 114 and 116, which have more margin between recorded settlement and the allowable limit, will be determined by a short level loop from rock-founded reference monument J, through the points, and back to the monument. This loop will involve a minimum of set-ups and will be performed with second order Class II accuracy. The loop will also include points 113 and 117 as a check against the direct reading method.

All settlements recorded by the direct reading method will continue to be referenced to the original baseline date for each point to maintain continuity.

When any settlement point listed in Table 3.7-5 is inaccessible during a survey, comparison to allowable settlement shall be based on settlement of other points on the same structure or on nearby structures having similar foundation conditions. When any settlement point listed in Table 3.7-5 is dislocated or replaced, a documented review of the settlement records of points on the same structure and additionally points on nearby structures having similar foundation conditions shall provide a new reference elevation for the point that reflects the estimated settlement since the base-line survey. If the total settlement or differential settlement exceeds 75 percent of the allowable value, the frequency of surveillance shall be increased as dictated by the engineering review.

Allowable differential movement is controlled by pipe deflections permitted by fixation points in buildings. The items limiting differential settlement are as follows:

Item No.	Reference	Monitoring Points	Limiting Item
1	Service Building (E-14)	Unit 2 Main Steam Valve House	24"-WS-426,428, 434, 436-151-Q3
2	Service Water Pump House	Service Water Piping @ SWPH	Expansion Joint

The items limiting total settlement of structures are as follows:

	Monitoring Points	Limiting Items
3	Service Water Piping @ SWPH	36"-WS-1,2-151-Q3
4	Service Building (E-15)	16"-WFPD-409,413,417 32"-SHP-401, 402, 403
5	Service Building (E-17)	36"-WS-1,2,3,4-151-Q3
6	Service Water Valve House	32½"-WS-D84-151-Q3
7	Service Water Tie-in Vault	36"-WS-1,2-151-Q3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 167 AND 147 TO

FACILITY OPERATING LICENSE NOS. NPF-4 AND NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

NORTH ANNA POWER STATION, UNITS NO. 1 AND NO. 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By letter dated October 2, 1989, and as supplemented by letters dated April 29 and August 24, 1992, the Virginia Electric and Power Company (VEPCO) requested a change to the Technical Specifications (TS) for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). The proposed change requested approval for: (1) deletion of settlement monitoring from most of the Category I structures from the NA-1&2, and (2) increased allowable differential settlement limits for certain structures. VEPCO proposed to delete from the TS, 47 out of the 51 markers located in the main plant area, and 5 out of the 17 markers located in the Service Water Reservoir (SWR) area. The proposed TS change would reduce the total number of settlement markers being monitored from 68 to 16.

The April 29 and August 24, 1992, letters provided additional information requested by the staff. This additional information requested by the staff did not alter the proposed action or affect the staff's determination of no significant hazards consideration as noticed in the Federal Register on February 7, 1990 (55 FR 4283).

2.0 BACKGROUND

VEPCO commenced a settlement monitoring program at NA-1&2 in May 1976. In August 1976, VEPCO's survey of the Service Building (SB) in the main plant area indicated apparent settlement that would have caused excessive stresses in the four 24-inch diameter service water (SW) pipes buried beneath the footing of this structure. Therefore, in April 1977, VEPCO took remedial action by cutting these SW pipes to relieve the streses accumulated since the initial imposition of loading in 1972, and rewelded them. VEPCO established a baseline for future surveys assuming zero differential settlement of pipes at that time.

Table 3.7.5 of the NA-1&2 TS lists 51 settlement measurement points in the main plant area. In October 1977, based on projected settlement of the structures, an allowable differential settlement of 0.03 foot (ft) between settlement point 117 located in the SB and point 113 located in the Main Steam Valve House (MSVH)/Quench Spray Pump House (QSPH) was specified in the plant TS for settlement monitoring. Subsequently, VEPCO found that the measured differential settlement between the two points gradually approached the allowable value. Partly to alleviate this problem, VEPCO performed a pipe stress analysis, and submitted a TS change request on March 10, 1988, to increase the allowable differential settlement between points 117 and 113R (which replaced point 113). VEPCO also used improved surveying equipment, and performed additional surveys which indicated that the measured differential settlement between the above two points was, in fact, less than 75% of the allowable value. Based on a review of the data obtained by VEPCO using the new surveying equipment, the NRC staff did not see any need to increase the allowable differential settlement between points 117 and 113R, and rejected the TS change request by letter dated March 31, 1992. Furthermore, the staff raised concerns about the accuracy of the measured settlements, and also about the pipe stress analysis.

As noted in the introduction, VEPCO submitted a comprehensive report on October 2, 1989 for the settlement monitoring program at North Anna. In that report, it requested staff approval: (1) to delete, from the NA-1&2 TS, settlement monitoring requirements for most of the structures that are founded on rock or on concrete backfill over rock, and (2) to increase the allowable differential settlement limits for certain structures. In response to a staff request, VEPCO submitted an updated report containing the results of settlement monitoring surveys performed through April 1992. The review of VEPCO's request to delete the settlement monitoring for most of the Category I structures has been completed. Also, VEPCO's request to increase the allowable differential settlement limits of certain structures has been reviewed and approved based on the evaluation of stress calculations and comparison against allowable stresses.

3.0 DISCUSSION

The majority of the Category I structures at NA-1&2 are founded on rock, or on concrete backfill over rock. Portions of the foundations of a few structures (e.g., the SB) are supported on residual soil, structural fill over residual soil, or structural fill over rock. VEPCO reported in its October 1989 submittal that most of these structures are heavily-reinforced concrete shear-wall-type structures with thick mat foundations, and that no settlement-related cracking of the walls for these structures had been observed.

Two structures, i.e., the NA-2 MSVH/QSPH (where settlement point 113R is located) and the Auxiliary Building, are partially rock-founded. Both these buildings are heavily-reinforced concrete shear-wall-type structures and have thick mat foundations. The western end of the SB from column 14 to column line 17-1/2 is founded on structural fill over either bedrock or a layer of

residual soil. In the area of column line 14 (where settlement point 117 is located), the foundation material is structural fill underlain by a layer of residual soil which, in turn, is underlain by bedrock. Again VEPCO reported that no settlement-related cracks of shear walls had been observed.

In its report of October 2, 1989, VEPCO stated that from the beginning of the formal settlement monitoring program in 1976, its survey results were inaccurate due to two types of survey errors (i.e., random survey error and systematic survey error) caused by the following factors.

1. Long survey loops from distant benchmarks were used from 1976 until 1979. (Random errors are always present in measurements accumulated by the increased number of leveling setups involved in a long survey loop). In 1979, VEPCO established two rock-founded benchmarks closer to the main power block area, thus reducing the survey loop lengths considerably.

2. Because of obstructions preventing access to survey markers, settlement readings on about 75% of the markers were taken by what are called, "side shots", which are not part of the main survey loop. These are not as accurate as the "turning point shots" in which the marker point is a part of the continuous survey loop. While the elevation taken by a turning point shot is included in the calculation of the allowable survey closure error at the completion of the survey loop, the side shot elevation is not included in the closure error calculation, thus contributing to inaccurate results in the elevations of about 75% of the markers.

3. Until 1987, VEPCO used a wooden survey rod, called Yard Rod, which is not very accurate. From 1987 onward, an Invar Rod, made of a highly temperature-resistant invar scale attached to an aluminum rod, was used. This rod, which can be read accurately to 0.001 feet, has some problems at certain locations of settlement markers because of the size of the rod. When obstructions or other access problems prevented the use of either the Yard Rod or the Invar Rod, VEPCO utilized either a 5-foot section of a Philadelphia Rod or a folding Engineers Rule. The use of the four different types of survey rods, each having certain shortcomings, introduced systematic errors in the survey data, and indicated apparent upward movement of certain markers.

As a result of a detailed evaluation of its surveying procedures, VEPCO identified the above survey errors and corrected its results by using statistical procedures. The NRC staff and its consultants visited the site in May 1989 when a surveying specialist performed an independent settlement measurement using his own equipment. This independent survey verified the accuracy of VEPCO's differential settlement measurement between the two points, 113R and 117, after VEPCO had corrected its data to account for the effects of using different survey rods.

Based on the results of a detailed evaluation and corrections of its settlement data, VEPCO found that there has been very little settlement for most of the structures supported on rock or on concrete backfill over rock. Therefore, VEPCO proposed to delete from the plant TS all but six settlement markers, i.e., four markers, 113(113R), 114, 116, and 117, located in the main plant area, and two markers, SM-17 and SM-18, located in the Service Water Reservoir (SWR) area. In addition to these 6 markers, VEPCO will continue to monitor 10 other markers located in the SW Pumphouse, SW Valve House, and SW Tie-in-Vault.

Based on a review of the updated, corrected settlement data pertaing to all the Category I structures in the main plant area submitted in April 29, 1992, the staff concurs with VEPCO's finding that the settlements of most of the structures have stabilized and are within the allowable limits.

As noted above, the staff had previously reviewed VEPCO's evaluation of underground pipe stresses due to differential settlement of Class I structures at NA-1&2. The staff's review comments were forwarded to the licensee by letter dated May 8, 1992, and basically questioned the adequacy of pipe models used for ASME Code stress calculations, including the adequacy of soil spring constants, spacing of springs, and anchor stiffness values used. By letter dated September 29, 1989, VEPCO stated that a two- to ten-fold increase or decrease of the anchor translational stiffness values would result in a less than 1% change of critical pipe stress levels. Also, by letter dated May 21, 1992, VEPCO indicated that with the use of a conservative rotational anchor stiffness (50% larger than that calculated), there is no significant sensitivity of critical pipe stress levels to a reasonable bounding increase or decrease in other parameters. The reason for such insensitivity in the parametric studies is judged to be due to the fact that the prescribed vertical settlement and the slope at the SB end of the pipe model override the significance of the corresponding anchor stiffness. VEPCO also indicated that conservative estimates of soil spring stiffness and spacing of springs were utlized in the pipe stress calculations. The staff finds VEPCO's response to be acceptable since conservative estimates of soil spring stiffness and spacing of springs were utilized in the pipe stress calculations.

For the buried SW piping between the NA-2 MSVH and SB, these conservative estimates and a future differential settlement corresponding to the proposed revised TS limitation of 0.047 ft. would result in a critical stress of 44,176 psi. This critical stress includes the residual stresses which existed prior to 1977 when portions of their pipes were cut and when a baseline for future settlement was established by assuming zero settlement at that time. This critical stress is within the applicable Code-allowable stress of 45,000 psi and is, therefore, acceptable.

The margin of safety as defined in the TS provides assurance that the settlement of structures does not exceed the allowable settlement limit which, in turn, does not cause unacceptable pipe stress. Since the basis for TS 3/4 4.7.12 is to maintain pipe stress within Code allowables, the staff

agrees that the margin of safety is not significantly reduced and VEPCO's evaluation remains valid and therefore, the staff finds VEPCO's request to increase the allowable differential settlement values of specified structures to be acceptable.

During the course of the review of these matters, the staff discussed its concern with VEPCO concerning the apparent lack of proper quality control in surveying procedures. Following these discussions, VEPCO submitted by letter dated August 24, 1992, a proposal agreeing to do the following.

1. VEPCO will submit to NRC, after the TS are changed, the results of the next 4 semi-annual surveys of the 16 markers (which VEPCO will continue to monitor) so that NRC can review them and verify that proper quality control is being exercised in settlement monitoring of Category I structures. The survey results will be submitted no later than 60 days after the completion of each semi-annual survey.

2. VEPCO will maintain all the settlement points deleted from the TS to the extent practicable and it will not initiate actions to physically remove existing settlement points. However, VEPCO will not relocate any point that may be obscured or removed due to a future design change. VEPCO has stated, in this connection, that past experience indicates that design changes of such a nature seldom occur.

4.0 EVALUATION

Based on the information and settlement data submitted by the licensee, the staff finds acceptable the deletion from the NA-1&2 TS 3/4.7.12 the requirement to monitor the settlement of all Category I structures in the main plant area which have not exhibited any significant settlement since the inception of monitoring. VEPCO will continue to take measurements on four markers in the main plant area, and two markers in the SWR area, in addition to 10 markers in the SW Pumphouse, SW Valve House, and SW Tie-in Vault. The TS change will reduce the total number of settlement markers being monitored from 68 to 16.

In addition the staff finds acceptable VEPCO's proposed TS 3/4.7.12 limitation of 0.047 ft for allowable differential settlement pipe stress limits. Since the basis for TS 3/4.7.12 is to maintain pipe stress within Code allowables, the VEPCO evaluation is enveloped by applicable Code allowable stress values and remains valid and is acceptable.

Finally, the staff finds acceptable the licensees proposed actions to demonstrate that the quality control procedures for the settlement monitoring program are adequate. Therefore, based on all of the above, the staff finds the proposed changes to the TS changes to be acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendment. The State official had no comment.

6.0 ENVIRONMENTAL CONSIDERATION

These amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no pubic comment on such finding (55 FR 4283). Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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